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# THE DIPHTHERIA SITUATION IN CAPE BRETON ISLAND, NOVA SCOTIA, OVER A TWO-YEAR PERIOD

M. R. MACDONALD, M.D., C.M., D.P.H.
*Director*
*Cape Breton Island Health Unit, Nova Scotia*

CAPE Breton Island is the most easterly part of the Province of Nova Scotia and is separated from the mainland by the Strait of Canso. It comprises four counties, Cape Breton, Inverness, Victoria and Richmond, and has a total population of 150,167 (1941). Its area is 3,970 square miles, its greatest length being one hundred miles and the greatest breadth eighty-seven miles.

Because our diphtheria cases occurred in Cape Breton and Inverness counties, a word regarding the physical set-up of these counties is not amiss. Cape Breton County is the most densely populated, and here dwell 110,713 persons. Within a radius of fifteen miles of the city of Sydney, which is the most important centre, there are six incorporated towns. Among these is the town of New Waterford, which is a prosperous coal-mining town with a population of 11,000. It is situated approximately fourteen miles from Sydney. People from New Waterford travel back and forth daily to Sydney, which is the terminus for Canadian National Railways. Inverness County is the second largest county, with a population of 20,573. Inverness town, the most important town in the county, is a coal-mining town and at the present time has a population of about 2,500. It is the terminus for the Inverness railway, which connects with the main line of Canadian National Railways at the Strait of Canso.

Also situated in Inverness county, on the north-east coast of Cape Breton, is the village of Cheticamp, which is about fifty miles farther north than Inverness. There is a great deal of traffic to and from the town of Inverness because of the railway and the market centre there. These are the salient features of the physical set-up.

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Keeping in mind the town of New Waterford, the town of Inverness and the village of Cheticamp, it is interesting to note that there is also a great deal of traffic between the town of New Waterford and the town of Inverness because of the fact that a large number of families, usually estimated at two or three hundred, have moved from Inverness to New Waterford in recent years.

I have already mentioned the intercommunication between Inverness and Cheticamp. Lastly, there is a large amount of intercommunication between Cheticamp and New Waterford. Cheticamp has a large French Acadian population, while New Waterford has a large section of its population that is of French Acadian descent and who visit back and forth with the people of Cheticamp.

These three areas comprise the places of occurrence of the large number of our diphtheria cases, and it will prove interesting to bear in mind the relationship existing between the people of these communities.

Public health services are carried on in Cape Breton Island under the jurisdiction of the Cape Breton Island Division of the Provincial Department of Health.

Diphtheria has been a serious problem in Cape Breton Island for some years, particularly in Cape Breton County. In 1938, following the formation of the Cape Breton Island Health Unit, a vigorous program of immunization against diphtheria was carried on both in the pre-school and the school age groups. As a result, a marked reduction in the number of cases of diphtheria was shown in the years 1938-1944, when again the incidence of diphtheria sharply increased and this continued during 1945.

The total number of cases in 1938 and subsequent years is shown in Table I.

TABLE I

TOTAL NUMBER OF CASES AND DEATHS FROM DIPHTHERIA, CAPE BRETON ISLAND, 1938–1945 inclusive

| 1938 | | 1939 | | 1940 | | 1941 | | 1942 | | 1943 | | 1944 | | 1945 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C. | D. | C. | D. | C. | D. | C. | D. | C. | D. | C. | D. | C. | D. | C. | D. |
| 127 | 13 | 43 | 8 | 16 | 0 | 42 | 1 | 16 | 4 | 26 | 3 | 69 | 10 | 110 | 6 |

In the years previous to 1938, the number of cases of diphtheria was known to be high but because of the incomplete reporting of cases, reliable figures are not available.

In Table I, it is interesting to note that during the years 1939-1941, the number of cases is relatively low—this at a time when elsewhere in Nova Scotia, notably Halifax, an epidemic of diphtheria was raging and wartime traffic between the mainland and Cape Breton Island was very heavy.

In the year 1944 there were 69 cases and 10 deaths from diphtheria, and in 1945 there were 110 cases and 6 deaths, making a total of 179 cases of diphtheria, with 16 deaths, in the two-year period from December 1, 1943, to November 30, 1945. It is with a review of diphtheria over this period of time that I am concerned.

Table II shows the age and sex distribution of the 179 cases occurring in Cape Breton Island during this period.

TABLE II

DIPHTHERIA CASES, CAPE BRETON ISLAND, 1944–1945
SHOWING AGE GROUPS AND SEX DISTRIBUTION

| Age Group | Male | Female | Total | Percentage |
|---|---|---|---|---|
| 0– 4 | 18 | 15 | 33 | 18.4 |
| 5– 9 | 26 | 24 | 50 | 28.0 |
| 10–14 | 10 | 12 | 22 | 12.3 |
| 15–19 | 9 | 10 | 19 | 10.6 |
| 20–24 | 9 | 8 | 17 | 9.5 |
| 25–29 | 2 | 9 | 11 | 6.1 |
| 30+ | 6 | 21 | 27 | 15.1 |
| Total | 80 | 99 | 179 | 100% |
| Percentage | 44.7% | 55.3% | | 100% |

From Table II it will be seen that 46.4 per cent of the cases were under ten years of age, 41.3 per cent of the cases were over 15 years of age, and females were attacked more often than males.

TABLE III

SEASONAL INCIDENCE OF DIPHTHERIA CASES,
Cape Breton Island, 1944–1945

| Year | Dec. | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1944 | 3 | 2 | 4 | 2 | 0 | 0 | 1 | 3 | 5 | 1 | 1 | 47 | 69 |
| 1945 | 6 | 4 | 5 | 0 | 1 | 0 | 4 | 11 | 14 | 22 | 19 | 24 | 110 |
| Total | 9 | 6 | 9 | 2 | 1 | 0 | 5 | 14 | 19 | 23 | 20 | 71 | 179 |

Table III presents the seasonal incidence of diphtheria cases. It will be noted that December refers to December 1943 and 1944 respectively, rather than 1944 and 1945. It is noteworthy that 65.3 per cent of the cases occurred between October and March inclusive, and that 31.3 per cent occurred in the summer months of July, August and September, at a time when one would expect the incidence to be much lower.

*Virulence and Strains of C. Diphtheriae*

In the report of Gibbard, Bynoe and Gibbons (1) on diphtheria in Halifax in 1940, of a series of 94 cases studied, 68 per cent were found to be due to virulent *gravis* strains, 30 per cent to virulent *intermedius* strains, and 2 per cent to virulent *mitis* strains. As at that time and later, it was very tempting to attribute the source of any diphtheria occurring elsewhere in Nova Scotia to Halifax, it is interesting to analyze our reports on the different strains of diphtheria. A series of swabs from 100 cases and carriers which were reported as being positive for *C. diphtheriae* were studied in detail. All our swabs were sent direct to the Provincial Laboratory in Halifax, where they were examined; but all virulence tests and typing of positive cultures were done at the Laboratory

of Hygiene, Department of National Health and Welfare, in Ottawa. I might say that we owe a debt of gratitude to Dr. E. T. Bynoe, who did most of the virulence tests and all the typing of strains.

Table IV shows the results of the examinations of these hundred swabs, according to the type of bacillus isolated.

TABLE IV

RESULTS OF EXAMINATION OF ONE HUNDRED POSITIVE SWABS ACCORDING TO TYPE OF C. DIPHTHERIAE ISOLATED
Cape Breton Island, 1944–1945

| No. of Positive Cultures Typed | Positive for Virulent *C. diphtheriae* | Type of *C. diphtheriae* | | | |
|---|---|---|---|---|---|
| | | *Mitis* | *Intermedius* | *Gravis* Type 1 | Atypical |
| 100 | 100 | 44 | 6 | 2 | 48 |

The *mitis, intermedius* and *gravis* strains are the same as those previously found in Nova Scotia and elsewhere, but a word about the atypical strain is in order. This is a *gravis*-like organism which failed to ferment starch and glycogen. It would agglutinate in *gravis* serum Type I, but invariably failed to remove that agglutinin from *gravis* Type I stock serum.

Generally the *mitis* strain occurred most frequently in the Inverness area, the *intermedius* strain in the Sydney area, and the *gravis* Type I (of which there were two) in the Cheticamp area. The atypical strain occurred in the New Waterford area first, and once in the Inverness and six times in the Cheticamp area. It is interesting to note that this strain occurred once previously in Nova Scotia, in a mainland village, about six months before it occurred in the New Waterford area. It was our impression that this atypical strain was brought to New Waterford by soldiers returning from the European theatre of war.

Table V shows the geographical distribution of the different strains.

TABLE V

ANALYSIS OF ONE HUNDRED POSITIVE SWABS ACCORDING TO TYPE OF C. DIPHTHERIAE ISOLATED AND AREA WHERE THEY WERE DISCOVERED,
Cape Breton Island, 1944–1945

| Place | *Mitis* | *Intermedius* | *Gravis* Type 1 | Atypical |
|---|---|---|---|---|
| Sydney Area | 4 | 6 | 0 | 0 |
| New Waterford | 3 | 0 | 0 | 41 |
| Inverness | 28 | 0 | 0 | 1 |
| Cheticamp | 9 | 0 | 2 | 6 |
| Total | 44 | 6 | 2 | 48 |

A rather peculiar thing is that, in spite of much travel between these various centres, the cases due to these different strains remain well localized. In the majority of cases there was presumptive evidence that visitors to and from these sections were responsible for carrying the germs. In some cases, we were able to get conclusive evidence, but for the most part we could not do so because of the

fact that very often we were late in getting this information and by the time the swabs on carriers were taken and sent to Halifax, the reports were usually negative.

*Incidence of Primary and Secondary Cases*

Further analysis of the 179 cases shows that there were 121 primary cases occurring in families and 58 secondary cases.

In 810 contacts of the primary cases there developed 58 cases of diphtheria. This is a secondary attack rate of 7.1, which is a reasonable figure. In all, 805 persons were swabbed, and of these, 243 were found to be positive for diphtheria. Distribution as to nose and throat, or both, is shown in Table VI.

TABLE VI

RESULTS OF EXAMINATIONS OF SWABS OF DIPHTHERIA CASES AND CONTACTS, Cape Breton Island, 1944–1945

| | Number swabbed | No. of nose and throat swabs positive | No. of throat swabs only positive | No. of nose swabs only positive | Negative |
|---|---|---|---|---|---|
| No. of primary cases 121 | 105 | 18 | 78 | 3 | 6 |
| No. of contacts of primary cases (including secondary cases) 810 | 805 | 50 | 167 | 26 | 562 |
| Total 931 | 910 | 68 | 245 | 29 | 565 |
| % | 100% | 7.4% | 27% | 3.2% | 62.4% |

The percentage of positive swabs obtained in primary cases is high. Table VI shows that positive results were obtained in 99 persons out of 105 from whom swabs were taken, leaving only 6 negative. Of the 16 cases not swabbed, either the doctor was called when death was imminent or the diagnosis was established after death; that is, the primary cases were missed or a diagnosis was definitely established by the subsequent development of other cases.

It must be remembered that all our swabs have to be sent from Cape Breton to the Provincial Laboratory at Halifax, and this has tended to produce negative results. At least twelve hours elapse before swabs arrive in the laboratory at Halifax from the nearest spot in Cape Breton, and at times the interval was nearer thirty-six hours.

*History of Toxoiding among the Cases*

In spite of the fact that immunization against diphtheria has been carried on extensively since 1938, it has not brought about the eradication of diphtheria in Cape Breton Island, and any investigation of diphtheria cases is not complete without a reference to the toxoid status. This is shown in Table VII.

1. Table VII shows that 107 or 59.8 per cent of the total cases had no toxoid. Of these, 59 cases (56 per cent) were well over 15 years of age, or outside the age when toxoid is usually given. One wonders whether or not this provides sufficient arguments for the holding of immunization clinics for adults.

TABLE VII

HISTORY OF TOXOID AMONG CASES OF DIPHTHERIA OCCURRING IN Cape Breton Island, 1944–1945

| Age Group | No. | No Toxoid | 1 Dose | 2 Doses | 3 Doses | Reinforcing Doses |
|---|---|---|---|---|---|---|
| 0– 4 | 32 | 21 | 5 | 0 | 6 | 0 |
| 5– 9 | 48 | 16 | 15 | 2 | 15 | 0 |
| 10–14 | 26 | 11 | 0 | 1 | 14 | 0 |
| 15–19 | 19 | 9 | 0 | 2 | 8 | 0 |
| 20–24 | 18 | 14 | 1 | 0 | 3 | 0 |
| 25–29 | 11 | 11 | 0 | 0 | 0 | 0 |
| 30+ | 25 | 25 | 0 | 0 | 0 | 0 |
| Totals..... | 179 | 107 | 21 | 5 | 46 | 0 |

2. Forty-six (25.7 per cent) claimed that they had had three doses of toxoid and an endeavour was made to check the records to prove these assertions. It was found that 24 had received toxoid in 1941 or previously, and had had no reinforcing dose, while 8 had toxoid during 1942 and had not had a reinforcing dose. Thus 32 cases had three doses of toxoid in 1942 or previous to that year. Of the remaining 14 cases, no record could be found for 4 of them, and as they gave a history of having been done in our clinics, records should have been available; another had completed the inoculations shortly before contracting the disease; and another received two series of three doses each.

In an analysis of these 46 cases with a history of having had three doses of toxoid, we were not disappointed to find that 30 were not completely protected against diphtheria. Of the remaining 16 cases, 8 had received toxoid in 1942, and some of these contracted the disease two or three years later.

While I cannot contrast these findings with the findings of others in regard to the occurrence of diphtheria among toxoided cases, because of the lack of detailed study, yet it is interesting to recall the findings of Gibbard, Bynoe and Gibbons(1) in the Halifax epidemic where 24 per cent of the cases were among the toxoided or naturally Schick-negative group.

The most important fact to be derived from this is the necessity of the reinforcing or "booster" dose.

3. Twenty-one cases (14.5 per cent) had one or two doses of toxoid and all but three were under 15 years of age.

We have records on file for 45,000 preschool and school age children who have had three doses of toxoid since 1938. While this program has been quite

successful, yet we have a big problem with defaulters from clinics; that is, there is a large number of parents who do not bring their children for the second or third dose, or in other words, their inoculations are not completed. Also, the problem of having them return for reinforcing doses is a serious one. We have already started an intensive campaign to have our school children receive reinforcing doses of toxoid. In addition, various educational and persuasive methods have been tried to remedy this situation.

This year we have attempted to Schick-test all the pupils in the town schools. Our program has been to give a reinforcing dose to all under 12 years and to the others who do not show a bad protein reaction. Of course, those who are Schick-positive have a full series of inoculations.

One cannot help but feel that the practical answer appears to lie in the introduction of an immunizing agent which will require a smaller number of doses to produce immunity. Especially is this true in rural areas, where parents have to travel a long distance with their children. I might mention here that for the past three years we have been using combined diphtheria toxoid and pertussis vaccine in our preschool groups and plain fluid toxoid in our school groups. (Both are Connaught Medical Research Laboratories preparations.)

*Mortality*

This paper would not be complete without a reference to mortality. In 1944, there were 69 cases and 10 deaths, giving a case fatality rate of 14.4. In 1945, there were 110 cases and 6 deaths, with a case fatality rate of 5.5. For the two-year period, the case fatality rate is 9. The high case fatality rate for 1944 may be accounted for by 6 fatal cases in which the diagnosis was missed. Of the fatal cases, only 7 had antitoxin and of these, 3 deaths occurred one to three weeks following an apparently good recovery. In one other case, antitoxin was withheld for two days because of an antipathy to any form of medication which was in keeping with certain religious beliefs.

Of the missed cases, diagnosis was confirmed by positive laboratory reports obtained after death or the subsequent development of cases in the home. Here it is interesting to note that, in one case, swabs were taken from the dead patient's nose and throat twenty-four hours after death and both were found to be positive. In another case, the patient was living alone and was thought to have been dead for about three days but positive swabs were obtained from the throat and the organism was a virulent *intermedius* strain. Not one of the fatal cases had three doses of toxoid. Regarding the age groups of the fatal cases, 14 (87.5 per cent) were 10 years of age or under.

Information regarding virulence and the strain of diphtheria is available for only 5 of the fatal cases. In all of these a virulent organism was found: 2 were atypical, 1 *intermedius*, and 2 *mitis*. Four others were probably *mitis*. I say this because subsequent cases in these households proved to be a virulent and *mitis* strain.

Diphtheria has caused us a great deal of anxiety in Cape Breton Island but we feel that we have weathered fairly well what seemed to be an always impend-

ing storm. Since December 1, 1945, the close of the two-year period covered by this review, diphtheria cases have occurred, particularly in the New Waterford and Inverness areas but the doctors are on the alert and I feel that there are no missed cases. Both the people and the doctors are on the lookout for diphtheria, and so more cases are being diagnosed and reported.

ACKNOWLEDGMENT

I wish to express my thanks once again to Dr. E. T. Bynoe for his valuable work in the study of the various strains discovered, and also to Dr. D. J. Mackenzie, Director of Laboratories for the Province of Nova Scotia, without whose aid this paper would not have been possible.

REFERENCE

Gibbard, J., Bynoe, E. T., and Gibbons, R. J.: Some Observations on Diphtheria in the Immunized Canad. J. Pub. Health, 1945, *36:* 188.

**ANNOUNCEMENT**

Effective January 1, 1947, annual membership dues in the Canadian Public Health Association will be $3.00. This fee includes the year's subscription for the Canadian Journal of Public Health.

An application form is available on page 2.

# NUTRITIONAL ASPECTS OF A SCHOOL HEALTH STUDY IN MARYSVILLE, NEW BRUNSWICK

JEAN F. WEBB, M.D., D.P.H.
*Director*
*and*
FLORENCE B. SWAN, B.Sc.(H.Ec.), C.P.H.
*Senior Nutritionist*
*Nutrition Services*
*New Brunswick Health Department*
*Fredericton, N.B.*

IN November 1945, a study was undertaken of the health of the school children of Marysville, an industrial community of 1,800 people five miles from Fredericton, N.B. The project was a co-operative effort of the Canadian Cottons Limited, owners of the cotton mill in which most Marysville wage-earners are employed, the Department of Biology of the University of New Brunswick, and Nutrition Services of the New Brunswick Department of Health. The purpose of the study was twofold: to determine health problems, especially those relating to nutrition of the Marysville school children, and to obtain information on the nutritional status and food habits of a group of New Brunswick children for the information of Nutrition Services.

Two weeks before the study was begun, a letter was sent to parents explaining the purpose of the project, emphasizing the medical service aspects of it, and requesting their presence at the medical examination. Parents returned permit slips as authorization to include their children in the study. Only eight of the 237 children in the school were not permitted to undergo examination. The ages of the group ranged from 6 to 15, in Grades 1 to 8. Medical and dietary studies were completed on 224.

Examinations were carried out in the school, with the assistance of the nurse employed by the Cotton Mill, from November 5th to 28th, an average of 14 examinations being completed per day. Approximately half of the children were accompanied by their parents, and from them information was obtained regarding the health of the children, notably their immunization histories.

Medical examination, including vision testing and examination of ears, nose, throat, chest, integumentary and skeletal systems, was supplemented by hæmoglobin determinations and patch testing for tuberculosis. Hæmoglobins were done by the method recommended for use with the Cenco Sheard Sanford Photelometer. Chest X-rays were done on positive reactors to the tuberculin test.

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A seven-day food record was kept by the children of Grades 5, 6, 7 and 8, and by the parents of the younger children, from which the data on food habits were compiled.

The findings of the study from a nutritional point of view may be divided into two sections, physical findings and dietary findings.

## Physical Findings

The general nutritional status of the children studied can be deduced from the general finding that 61 per cent were in satisfactory condition, classified as excellent or good, while 39 per cent were in unsatisfactory condition, classified as fair or poor. At the time of examination, the general clinical impression of the child from a nutritional standpoint was recorded. When compiling the data, an attempt was made to make this estimate more objective. The physical defects on which an opinion of nutritional status would be based, were grouped into six arbitrary categories:

1. Dental caries.
2. Mucous membrane and skin defects sometimes attributed to specific vitamin deficiencies.
3. Skeletal deformities—postural or rachitic in origin.
4. Anæmia.
5. Weight deviation.
6. Clinical impression of nutritional status.

A dental defect was charged when the child had two or more total caries.

Anæmia was designated by a hæmoglobin under 11.5 gms./100 cc.

Weight deviation was present when the child was 10 per cent or more underweight for age, or 20 per cent or more overweight for age, according to Baldwin Wood tables.

Clinical impression was that recorded at the time of examination.

| | | | | | |
|---|---|---|---|---|---|
| 0 | defects | classified | child | as | excellent |
| 1-2 | " | " | " | " | good |
| 3-4 | " | " | " | " | fair |
| 5-6 | " | " | " | " | poor |

This somewhat more objective method of assessment resulted in a redistribution of children from the extreme classifications of excellent and poor toward good and fair, without changing the ratio of those satisfactory to those unsatisfactory.

In further discussion, the more objective categorizations are used.

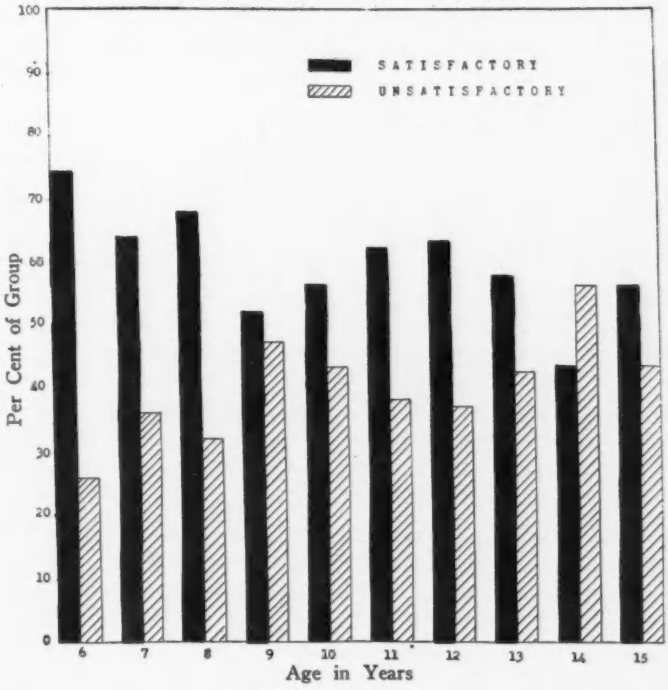
NUTRITIONAL STATUS

| *Calculated* | | | | *Clinical Impression* | | |
|---|---|---|---|---|---|---|
| Excellent | 28 | 13%) | | 35 | 16%) | |
| | | ) | 61% | | ) | 62% |
| Good | 108 | 48%) | | 103 | 46%) | |
| Fair | 79 | 35%) | | 71 | 32%) | |
| | | ) | 39% | | ) | 38% |
| Poor | 9 | 4%) | | 15 | 6%) | |

The age distribution of those of satisfactory and unsatisfactory nutritional status is shown in diagram form in Fig. I.

It is seen that the two categories have a fairly even distribution throughout all age groups. This is of interest when contrasted with the age distribution of satisfactory and unsatisfactory food intakes.

FIGURE I
NUTRITIONAL STATUS ACCORDING TO AGE




The overall incidence of defects manifesting or related to malnutrition is seen in Table I.

TABLE I
PHYSICAL DEFECTS MANIFESTING OR RELATED TO MALNUTRITION

| Defect | | Number | Percentage |
|---|---|---|---|
| Enlarged tonsils | | 42 | 18.7 |
| Enlarged tonsils with symptoms | | 11 | 4.9 |
| Dental caries* | | 168 | 75.0 |
| Mucous membrane and skin lesions | | 63 | 28.0 |
| Gingivitis | 37 | | |
| Cheilosis | 11 | | |
| Hyperkeratosis | 15 | | |
| Thyroid enlargement | | 18 | 8.0 |
| Rachitic bone changes | | 41 | 18.3 |
| Posture | | 89 | 39.7 |
| Anæmia† | | 33 | 14.7 |
| Underweight | | 18 | 8.0 |

*2 + total caries
†Hæmoglobin under 11.5 mg/100 cc.

The figures on dental caries confirm the impression formed at the time of examination that dental care was the outstanding need in the group of children examined. Other defects, in order of incidence, are defective posture, rachitic bone changes and anæmia. The low incidence of underweight in the group would indicate that the caloric intake was reasonably satisfactory. Enlarged tonsils are included not as a manifestation of malnutrition, but as a common source of chronic infection with its effect upon appetite and general health. The incidence of gingivitis, cheilosis and hyperkeratosis is included as a matter of record. No inference is drawn regarding the specificity of these lesions. Since diets were not analysed for specific nutrients, no correlation of defects and dietary intakes was attempted.

## Dietary Findings

As mentioned before, the food-consumption data were obtained from a seven-day food record kept by the children of grades 5 - 8 and by the parents of the children of grades 1 - 4. Two hundred and twenty-four complete records were obtained from children who underwent physical examination.

This dietary information was treated in such a way as to determine: (a) group consumption of individual foods, (b) individual food habits, and (c) meal patterns.

Standards for adequacy of foods consumed were based on Canada's Food Rules.

### *(a) Group Consumption of Individual Foods*

To evaluate the food intakes, the 224 dietaries were first graded as to the satisfactory or unsatisfactory intake of individual foods. Milk and bread were assessed on the basis of daily consumption; other foods or food groups, namely, cereal, citrus fruits, tomatoes, other fruits, potatoes, other vegetables, meat, eggs, were assessed on the basis of weekly consumption. Intakes were graded according to a standard. For example, a milk consumption of 3 or more cups per day was considered satisfactory; less than that, unsatisfactory. Five servings of meat, fish or poultry per week were considered satifactory; less than that, unsatisfactory. For details see Table II.

TABLE II

BASIS OF PROCEDURE USED IN GRADING FOOD INTAKE

| FOODS | UNITS OF SERVINGS | FOOD INTAKE | | | |
|---|---|---|---|---|---|
| | | *Excellent* | *Good* | *Fair* | *Poor* |
| Milk | Cups daily | 4 or more | 3 | 2 | 1 or less |
| Bread | Slices daily | 4 " " | 3 | 2 | 1 " " |
| Cereals | Servings weekly | 7 " " | 5 | 3 | 2 " " |
| Citrus fruits or tomatoes | " " | 7 " " | 5 | 3 | 2 " " |
| Other fruits | " " | 7 " " | 5 | 3 | 2 " " |
| Potatoes | " " | 7 " " | 5 | 3 | 2 " " |
| Other vegetables | " " | 14 " " | 10 | 5 | 4 " " |
| Meat, fish or poultry | " " | 7 " " | 5 | 3 | 2 " " |
| Eggs | Number weekly | 5 " " | 3 | 2 | less than 2 |

The percentage of children having satisfactory or unsatisfactory food intakes by food groups is shown in Table III.

It is strikingly apparent that this group of children attain near optimum levels of consumption in very few foods, namely, potatoes, meat, and to a lesser degree fruits other than citrus. At the other extreme is the low consumption of vegetables other than potatoes—less than 1/5 of the group receiving what is considered to be an optimum amount of this food.

TABLE III

PERCENTAGES OF GROUP SHOWING SATISFACTORY AND UNSATISFACTORY INTAKES OF INDIVIDUAL FOODS

| *Foods consumed* | *Satisfactory%* | *Unsatisfactory%* |
|---|---|---|
| Milk | 52 | 48 |
| Bread | 57 | 43 |
| Cereals | 55 | 45 |
| Citrus fruits or tomatoes | 51 | 49 |
| Other fruits | 71 | 29 |
| Potatoes | 98 | 2 |
| Other vegetables | 18 | 82 |
| Meat, fish or poultry | 95 | 5 |
| Eggs | 52 | 48 |

(*b*) *Individual Food Habits*

Each of the 224 dietary records was studied separately in order to determine the average daily or weekly consumption of the foods tabulated in Table I. The same standards of adequacy were used and each individual's food intake was classified as satisfactory or unsatisfactory. This analysis, substantiated by a subjective review of the daily food habits as to variety, quality and quantity of foods, revealed that 39 per cent of the group were receiving satisfactory food supplies, while the remaining 61 per cent were receiving unsatisfactory supplies of food.

The diets were not analysed for consumption of specific nutrients.

The grading of food intake shows an interesting trend when it is broken down into ages as in Fig. II. This analysis shows a general deterioration of food habits with increasing age. At age 6, 60 per cent have diets satisfactory as to variety and quantity; at age 13, 25 per cent are satisfactory; and in the small 15 - 16 age group, none of the food intakes are satisfactory. The same trend was noted in a detailed analysis of individual meals. At age 6, 43 per cent have satisfactory breakfasts; at age 15, none have.

(*c*) *Meal Patterns*

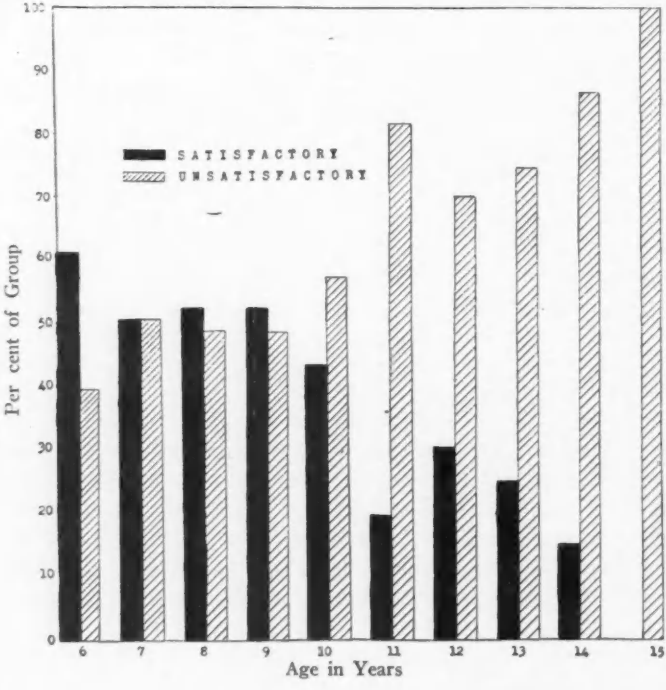
On studying individual meal patterns, it was found that breakfasts and suppers were the meals most commonly found to be inadequate, with 66 per cent of the whole group showing unsatisfactory breakfast and supper patterns. Of the 33 per cent satisfactory breakfast patterns, only 4 per cent habitually maintained an excellent standard.

Breakfast was graded as excellent if it contained citrus fruit or tomato, milk, whole grain cereal and toast, plus egg or bacon three to four times weekly. A poor breakfast consisted of any one of fruit, milk, cereal or toast, egg or bacon,

plus or minus non-nourishing extras such as cake, candy, etc. Most common reasons for poor grading of breakfast were lack of fruit, cereal, and milk, in the order named.

FIGURE II

SELECTION OF FOODS ACCORDING TO AGE




In a study of this sort, the question is often raised of the probability of individuals padding or falsifying their food records. We believe that the following recorded breakfasts remove this suspicion:

(1) Two eggs, bread, chicken dressing, milk, water, root beer.

(2) Sardines and candy.

(3) One vitamin B complex tablet, 1 multiple vitamin capsule, bread and sandwich spread.

Dinner was the best meal of the day, being satisfactory in 47 per cent of cases. An adequate dinner contained meat, fish or poultry, potatoes, other vegetable, dessert, milk.

The most common omission was vegetable, and the second most common was milk.

Supper was satisfactory in a low percentage of cases—33 per cent. A supper was graded as good if it contained protein food, vegetable (if two were not eaten at dinner), bread and butter, milk, and dessert (preferably fruit).

Items most comomnly missing were protein food, vegetable, milk and fruit, in the order named.

As a result perhaps of an early supper hour, a considerable number of children had what almost amounted to a fourth meal in mid-evening. The foods eaten between meals in order of selection were fruit, milk, candy, bread.

The common errors or omissions in food selection manifested in this study were as follows:

Liver was consumed once a week by only 10 per cent.

Cheese was consumed frequently by 33 per cent.

Concentrated sweets, cake, cookies, pie, were consumed in excess by 8 per cent, candy by 6 per cent, tea and coffee by 9 per cent.

Ninety-eight per cent of the bread consumed was white, and 50 per cent of the cereal was whole grain.

Thirty-three per cent of the children, most of them under 12, received cod liver oil, which was commonly given in an emulsion form in a dosage recommended for pure cod liver oil, hence supplying an inadequate amount of vitamin D.

In summary, food habits of Marysville school children are, when reviewed as a group, not satisfactory. An examination of individual eating habits reveals that certain of the children, particularly those in the older age groups, are not receiving adequate supplies of protective foods. Outstanding among these are vegetables and whole-grain bread and cereals. To a lesser degree, individual deficiencies are also noted in the use of citrus fruit and tomatoes, milk and eggs. With regard to meal patterns, the general picture is again unsatisfactory, with many cases manifesting glaring examples of wholly inadequate breakfasts and suppers.

The findings of the study were reported through several channels. Parents received individual reports on the physical and dietary findings, with recommendations for the correction of faults where they existed. The public health nurse was given a list of children with specific defects that she might endeavour to see that corrective work was being done. A meeting of the teachers in the school was held in which they were told of the outstanding health problems in their school. Samples of educational materials were shown, and the teachers ordered those they considered most useful to supplement their health teaching.

On completion of the study, it was felt from the findings on physical examination that nutrition was not the outstanding health problem in the population studied. However, the dietary analysis suggested that there were many of the children in the community having a suboptimal food intake, the ill effects of which on their health and growth might not be apparent for a considerable period of time. The incidence of rickets, the inadequate amounts of specific protective foods received by roughly half of the group, the deterioration of food selection with increasing age, defective meal patterns, notably breakfast and supper—all these demonstrated the need for nutrition education not only to inform, but to change habits. The fact that 60 per cent of six-year-old children received satisfactory diets was evidence that many parents knew what constituted an adequate

diet for children. The fact that by the age of 15, none of the group received satisfactory diets, suggested that the children had not been taught to like good food, so that as parental control over food selection became less apparent, the children chose an inferior diet as more to their taste. The study pointed out the need for education in the development of good food habits. Such education is more profitably directed toward small children before the bad habits have developed; but, in this instance, it should be directed also toward older children to change their faulty eating practices before they have become too well established.

## Summary

Physical examination and a study of food habits conducted on 224 school children in Marysville, N.B., indicated the following conclusions:

1. Physical examination showed that 61 per cent of the children were in a satisfactory state of nutrition, while 39 per cent were graded as unsatisfactory. Dental care was the outstanding need. The other major defects, in order of incidence, were defective posture, rachitic bone changes, and anæmia.
2. For most of the children, the use of protective foods was considered to be inadequate. Many meal patterns, particularly for breakfast and supper, were unsatisfactory.
3. There was a gradual deterioration of food habits with increasing age.
4. A need for nutrition education to change food habits was evident.

The authors wish to express their indebtedness to the International Health Division of the Rockefeller Foundation, and to Canadian Cottons Ltd., for financial assistance, and to Miss Grace Bruce, R.N., Miss Elizabeth Baird, M.A., Dr. C. W. Argue, Professor of Biology, University of New Brunswick, and the staff of the Marysville School for their very helpful collaboration.

# MORTALITY REDUCTIONS IN ONTARIO, 1900-42
## VI. SCARLET FEVER

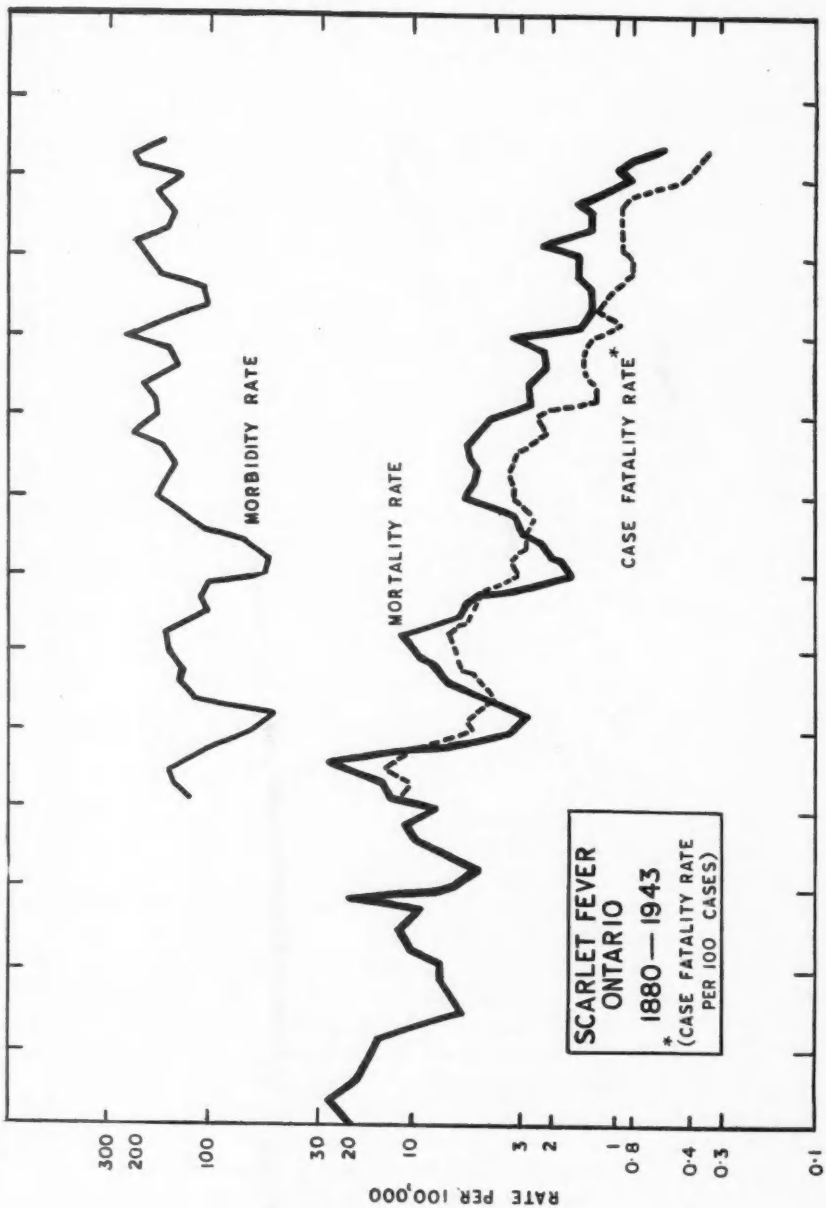
N. E. McKINNON, M. B.
*Department of Epidemiology and Biometrics*
*University of Toronto*

IN reviewing mortality reductions in the Province of Ontario[1] since the beginning of the century, measuring their extent and considering a little though not always identifying their cause, the decline in scarlet fever death rates deserves some attention. The decline, in this as in many parts of the world, is thoroughly established and well recognized. Here, in Ontario, it accounts for something under 5 per cent of the total two-thirds decline in mortality from all causes in the 1-4, 5-9, and 10-14 age groups. The reasons for this decline are not known. The preceding sentence does not by any means represent a new or an original or isolated finding or opinion; it is the consenus of most reviews of scarlet fever mortality appearing in medical literature in the past 15-20 years. It may, however, require brief elaboration in so far as the local situation, the Province of Ontario, is concerned: hence this note with the accompanying diagram showing, in outline, the *recorded* morbidity rates since 1901 and the *recorded* mortality rates since 1880. Sharp distinction must be drawn between recorded and actual rates.

### Morbidity

In the first half of the period, the *recorded* morbidity rates exhibited wide fluctuations, of slightly irregular periodicity, and were on a lower average level of approximately 100 per 100,000 than in the later half; since 1920 the average was nearer 200 per 100,000, with proportionally smaller fluctuations. This recorded increase is in all likelihood due to differences in diagnosis and reporting rather than to an actual increase of scarlet fever. Early in the century the diagnosis of scarlatina was relatively common, some physicians considering the condition a different disease with less need for reporting. To-day the term is seldom used, such cases being diagnosed as scarlet fever with the full implications, in regard to spread, of that diagnosis. The wider employment of public health personnel in the community has probably accounted for the detection of more cases, even late ones, and for general improvement in reporting. But even to-day, it is accepted that not even all diagnosed cases are reported, let alone the undiagnosed cases. It is, therefore, incorrect to assume that the reported cases give an accurate picture of the volume of scarlet fever morbidity

[1]McKinnon, N. E., Mortality Reductions in Ontario, 1900-1942. Canad. J. Pub. Health, 1944, **35**: 481.




SCARLET FEVER, ONTARIO, 1880-1943
MORBIDITY AND MORTALITY RATES PER 100,000 POPULATION

or that a change in the average rate over a period of years necessarily indicates a change in the incidence of the disease. The line of the recorded rates, then, does not establish whether the actual incidence increased, decreased or remained stationary. On the other hand, the recorded morbidity rates of to-day do indicate in themselves, and beyond doubt, that the incidence of scarlet fever is not controlled. The occurrence of scarlet fever, even to the recorded level, is quite incompatible with any reasonable concept of control. The so-called "control" measures over these years have been the application of the official "regulations for the control" of this disease, regulations requiring notification, isolation and quarantine, the isolation period varying from seven weeks in the earlier years to three weeks at the present time, quarantine now being less rigorously applied than formerly, but still required. In addition, since 1925, toxin and antitoxin have been used prophylactically, to some considerable but unequated extent. The only conclusion permissible, then, and one worth repeating, is that the various so-called control measures as applied in the Province over the past forty-four years have not achieved anything suggestive of effectual control of scarlet fever morbidity.

## Mortality

The line of the *recorded* mortality rates is distinctly different from that of recorded morbidity. It shows, as indicated previously, a marked decline, similar to declines experienced in other places and similarly well recognized for many years. Up to about 1920, the rates exhibit wide fluctuations of slightly irregular periodicity, with the peaks reaching 27.9 in 1882, 21.3 in 1894, 25.8 in 1903, 11.5 in 1911, and 5.9 per 100,000 in 1920; the low points vary from 5.7 per 100,000 in 1887, 4.7 in 1896, 2.8 in 1906 to 1.5 in 1915. After 1920, the fluctuations are less marked and the rate continues to fall to a low of less than 1 per 100,000 in 1943.

It is difficult to identify the onset of the decline; it may have been earlier than 1880. In a general view of the whole experience, however, there is a strong suggestion of some degree of uniformity, apart from the periodic fluctuations, in the rate of decline. Of course, this line is subject to different interpretations; but certainly there is no abrupt, sustained acceleration of decline such as marked both morbidity and mortality of diphtheria when control was really achieved through toxoid. It should be noted here that, in Ontario as elsewhere, the deaths *charged* to septic sore throat have increased in recent years so that the deaths now so charged approximate those charged to scarlet fever. Including these with the scarlet fever deaths, however, does not change the general lie of the line materially.

Why this decline in mortality? That is the embarrassing question for which there is no satisfactory answer. There will be general agreement that, in recent years, sulphonamides and penicillin *may* be factors, but the major part of the decline occurred long before the introduction of either of these agents or of antitoxin. Reams have been written on the possible causes of the decline, but there is nothing gained by mulling over, here, the various factors that might

or might not affect either seed or soil. The fact is that the factor or factors responsible for the decline are not known.

We have, then, a marked decline in mortality, fortunately, but, not knowing the cause of the decline, it is quite wrong to refer to it as "control". Having such a decline without knowing its cause does not make for a very happy state of affairs. Whatever have been the factors responsible for the decline, not knowing them, we may find them in the future operating in the reverse direction, in which case our inability to control will be more manifest though it should not be any more humiliating, provided we do not continue to call it "control".

## Summary

The recorded morbidity rates of scarlet fever in Ontario since 1900 show a generally higher level in the later half of this experience than earlier. This, in all probability, is due to changes in diagnosis and reporting. The vagaries inherent in such morbidity rates do not permit any conclusion as to whether the actual incidence of scarlet fever has increased, decreased or remained stationary. The present level of the rates, however, shows clearly, in itself, that scarlet fever has not been controlled by the application of official regulations "for the control" of the disease or by any other means as practised in this 44 years' experience in Ontario.

The mortality has fallen from about 20 per 100,000 in 1880, 10-20 per 100,000 early in this century, to less than 1 per 100,000 at the present time. The decline accounts for less than 5 per cent of the total decline in mortality from all causes in the 1-4, 5-9, and 10-14 age groups. The rate of decline is not marked by any abrupt, sustained acceleration at any time, such as might be expected to reflect the introduction and wide use of any efficient prophylactic or therapeutic agent or the general imposition of any effective measure of control. There is thus in this experience, as indeed in others, no convincing or satisfactory explanation of the decline. It should not, therefore, be referred to as "control".

# STUDIES OF THE SEROLOGY OF TYPHUS FEVER

M. ELIZABETH MALCOMSON[1] and FRANKLYN O. WISHART[2]

## II. *Complement-Fixing Antibody Response to Vaccination and to Infection*

WHILE the Weil-Felix reaction—the agglutination of Proteus OX19 in typhus serum—has been the traditional laboratory aid for the diagnosis of typhus fever, it is obvious that a test, or tests, in which the aetiological agent serves as the antigen, should be preferable. The antigen in Proteus OX19 responsible for reactions in typhus serum is shared by epidemic and murine rickettsiae, and thus, while useful for the early diagnosis of typhus infections, does not distinguish between the two types. Further, this antigen is only a part of the mosaic of the rickettsiae and is, therefore, incapable of demonstrating the complexity of the antibody picture following infection or vaccination. In the first paper of this series, Wishart and Malcomson (11) described the preparation of type-specific and common rickettsial antigens. The use and preparation of type-specific antigen was first reported by Plotz (8), and later described by Plotz, Wertman and Bennett (9), but it may be emphasized that in their studies the common antigen was not used for antibody estimations.

The primary purpose of this study was to determine the complement-fixing antibody response to vaccination and disease. It was hoped, in the first place, that data of a practical nature might emerge in regard to the diagnosis and differentiation of typhus infections. Secondly, in regard to vaccine, it appeared possible that complement-fixation tests might provide some indication of the dosage and interval between doses required for effective administration of vaccines to humans.

### Experimental

The complement-fixation technique employing type-specific and common antigens, has been described in a previous paper (11). An additional control was used in tests with sera from vaccinated persons or animals, namely, a normal yolk sac antigen to rule out egg antigen-egg antibody reactions.

### I. Response to Vaccination

#### (a) *Vaccinated Guinea Pigs*

Guinea pigs were inoculated intraperitoneally with 5 cc. of monovalent ether-processed yolk sac vaccine, either epidemic or murine type. The animals

*Contribution from the Connaught Medical Research Laboratories and School of Hygiene (Department of Hygiene and Preventive Medicine), University of Toronto, Toronto, Ontario, with financial assistance from the National Research Council of Canada.*

[1]*Technical Assistant, Connaught Medical Research Laboratories.*

[2]*Associate Professor of Hygiene and Preventive Medicine, Faculty of Medicine, University of Toronto.*

were bled by cardiac puncture two weeks later, and the antibody content of the sera investigated. A sample of a large number of such tests is shown in Table I.

From Table I it may be seen that no cross-reactions occurred with the specific antigens. In some sera specific antibody was present with no demonstrable

TABLE I

COMPLEMENT-FIXATION TITRES OF VACCINATED GUINEA PIGS

| Vaccine | Guinea Pig Number | Titre | | |
|---|---|---|---|---|
| | | Epidemic Specific Antigen | Murine Specific Antigen | Common (65°C.) Antigen |
| C263 | 913 | 1:400 | <1:25 | 1:200 |
| | 921 | 1:400 | <1:25 | <1:25 |
| | 914 | <1:25 | <1:25 | <1:25 |
| C264 | 394 | <1:25 | <1:25 | <1:25 |
| | 3207 | 1:200 | <1:25 | <1:25 |
| C266 | 760 | 1:400 | <1:25 | <1:25 |
| | 34 | 1:100 | <1:25 | 1:100 |
| | 536 | <1:25 | <1:25 | <1:25 |
| E261 | 327 | 1:200 | <1:25 | 1:200 |
| | 3943 | 1:50 | <1:25 | <1:25 |
| | 3405 | 1:400 | <1:25 | 1:400 |
| E262 | 117 | <1:25 | <1:25 | <1:25 |
| | 3801 | 1:400 | <1:25 | 1:400 |
| | 3594 | 1:200 | <1:25 | <1:25 |
| E260 | 3923 | <1:25 | <1:25 | <1:25 |
| | 3690 | 1:100 | <1:25 | 1:100 |
| E267 | 3984 | 1:400 | <1:25 | 1:200 |
| | 3944 | 1:100 | <1:25 | <1:25 |
| | 923 | 1:400 | <1:25 | 1:200 |
| C268 | 32 | 1:200 | <1:25 | 1:400 |
| C269 | 813 | <1:50 | <1:50 | <1:50 |
| | 3548 | 1:400 | <1:50 | 1:200 |
| | 363 | <1:50 | <1:50 | <1:50 |
| M270 | 3498 | <1:50 | 1:400 | 1:800 |
| | 3490 | <1:50 | 1:200 | 1:200 |
| M271 | 3745 | <1:50 | 1:200 | 1:400 |
| | 196 | <1:50 | 1:200 | 1:400 |
| M273 | 397 | <1:50 | 1:200 | <1:50 |
| | 3288 | <1:50 | 1:400 | 1:1600 |
| | 3552 | <1:50 | 1:100 | <1:50 |
| M274 | 755 | <1:50 | <1:50 | <1:50 |
| | 998 | <1:50 | 1:800 | 1:800 |
| | 922 | <1:50 | <1:50 | <1:50 |
| M275 | 577 | <1:50 | 1:200 | <1:50 |
| | 921 | <1:50 | 1:400 | 1:400 |
| M276 | 3609 | <1:50 | 1:100 | <1:50 |

C—Madrid Strain. E—Breinl Strain. M—Murine Strain. Egg antigen negative in all sera.

common antibody, but the reverse was never the case. In general, where both antibodies were produced the specific titre was higher than the common. Certain vaccines produced good responses in some of the animals but not in others which received the same inoculum. Egg antigen did not fix complement in any serum.

Information was also obtained on the relative duration of the antibodies by bleeding the guinea pigs at intervals for ten weeks after vaccination. While only a small number of animals were followed in this way, the results suggest that common antibody appears slightly earlier, reaches its peak a little sooner and fades more rapidly than the specific antibody. The peak titre of the latter occurred about three weeks after inoculation and in some instances measurable amounts were still present at ten weeks.

(b) *Vaccinated Humans*

Antibody development in vaccinated humans was studied in a number of different groups. The results obtained were very similar and only one group is presented here to illustrate the findings. This group consisted of 81 medical students who were given combined epidemic and murine vaccine. Division into 4 sub-groups permitted the effect of dosage and time interval between doses to be examined. Blood samples were drawn from each subject two weeks after the last dose of the primary course. Approximately five months later a second blood sample was obtained and a recall dose of 0.5 cc. of bivalent vaccine given. A third blood sample was drawn twelve days later. Preliminary samples were not taken, as previous investigations had shown that typhus complement-fixing antibodies were not present in similar unvaccinated individuals. Details of the experiment are shown in Table II.

The great majority in all sub-groups responded to vaccination by the production of epidemic type-specific antibodies. The response to the murine element of the vaccine was much less pronounced. This was to be expected as the vaccine contained two parts of epidemic to one part of murine rickettsiae. The production of common antibody was low or negligible in all groups. The best result, in terms of number responding, the titres reached and persistence of antibodies in the serum, was in the group receiving three doses of 1 cc. each with one week between doses.

The marked falling off in antibody titres five months after the primary course would suggest the wisdom of an early reinforcing dose of vaccine. The effect of the recall dose is seen in that a higher percentage of persons showed a measurable level of both common and specific antibodies and higher titres were reached by more persons than after the primary injections. This effect was more pronounced in the three-week interval groups where the primary response was feebler. Topping and co-workers (10) have noted the decrease in complement-fixation titre as time elapsed and the rapid rise of antibodies to high levels which persisted for a long period following the administration of a booster dose.

Mild to moderate local reactions to the vaccine were common, particularly with the larger initial dose. However, the reactions were, on the whole, considerably milder than would be encountered following typhoid vaccine and it was

TABLE II

COMPLEMENT-FIXATION TITRES IN HUMANS FOLLOWING BIVALENT VACCINE

| Dose CC. | Interval | Number of Individuals | Bleeding | Per Cent Showing Increase | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2-fold and > (1: 12.5 and >) | | | 4-fold and > (1: 25 and >) | | | 8-fold and > (1: 50 and >) | | | 16-fold and > (1: 100 and >) | | | 32-fold and > (1: 200 and >) | | |
| | | | | E | M | 65° | E | M | 65° | E | M | 65° | E | M | 65° | E | M | 65° |
| ¼, ½, 1 | 1 week | 16 | 1st | 100 | 56 | 6 | 89.5 | 50 | 0 | 68.5 | 25 | 0 | 31.5 | 12.5 | 0 | 12.5 | 0 | 0 |
| | | | 2nd | 38 | 13 | 0 | 19 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 3rd | 87.5 | 75 | 6 | 87.5 | 69 | 0 | 68 | 63 | 0 | 63.5 | 25 | 0 | 19 | 6 | 0 |
| 1, 1, 1 | 1 week | 19 | 1st | 100 | 79 | 15 | 100 | 58 | 10 | 89 | 41 | 5 | 52 | 16 | 0 | 5 | 5 | 0 |
| | | | 2nd | 38 | 17 | 0 | 33 | 16 | 0 | 16 | 11 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| | | | 3rd | 100 | 89 | 0 | 100 | 73 | 0 | 83 | 68 | 0 | 52 | 21 | 0 | 11 | 0 | 0 |
| ¼, ½, 1 | 3 weeks | 22 | 1st | 77 | 41 | 8 | 50 | 23 | 4 | 28 | 9 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| | | | 2nd | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 3rd | 96 | 82 | 31 | 72 | 55 | 4 | 32 | 32 | 0 | 28 | 9 | 0 | 0 | 0 | 0 |
| 1, 1, 1 | 3 weeks | 22 | 1st | 86 | 54 | 4 | 59 | 18 | 0 | 28 | 9 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| | | | 2nd | 14 | 9 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | 3rd | 86 | 78 | 18 | 77 | 64 | 0 | 50 | 32 | 0 | 18 | 0 | 0 | 0 | 0 | 0 |

1st bleeding—2 weeks after primary course, i.e., 4 weeks after 1st injection in 1 week group and 8 weeks after 1st injection in 3 week group.
2nd bleeding—4 to 5 months after primary course.
3rd bleeding—10 days after recall dose.
All sera negative with normal yolk sac antigen.

felt that the reactions reported were no contra-indication to the use of the larger initial dose if desired.

## II. Response to Infection

(a) *In Unvaccinated Persons*

Sera from 137 typhus cases which occurred in the Midle East (made available through the kindness of Major C. E. Van Rooyen) were tested by us for complement-fixing antibodies. The test was first carried out with soluble antigens and later 50 of the sera were retested with type-specific and common rickettsial antigens. The complement-fixation titres for these 50 sera are shown in Table III.

Space does not permit listing all 137 sera but the results are typified by those shown in the table. The antibody level as measured by the epidemic and murine soluble antigens was high in the great majority, 85 per cent showing a titre of 1 :800 or greater. In 21 cases the titres were equal for the two strains, in 25 there was a twofold difference and in 4 a fourfold difference. On this basis, differentiation of type of infection was impossible or uncertain in almost all.

The antibody level as measured by common antigen was also high and, in general, comparable with that observed with soluble antigen. This would indicate that the antibody measured by soluble antigen, in these cases, was largely common antibody.

The picture given by the type-specific rickettsial antigens was quite different. The titres were usually low or moderate only, and apart from interference by anticomplementary activities of the sera or very low titres, differentiation as to type could be made. Accepting a difference of fourfold or greater as significant, 60 per cent of these sera would be classed as of epidemic origin. A further 8 per cent on the basis of a twofold difference were probably epidemic. The remaining 32 per cent, for the reasons mentioned, were of undetermined origin.

It is regretted that so many of the sera were anticomplementary. This was probably due to long storage and to the presence of glycerine as a preservative. The absence of murine sera was also unfortunate. The relative stability of common and specific antibody has not been ascertained and the low titres of specific antibody may have been due to long storage. The day of disease, where reported, was not considered reliable, and no correlation could be made between the duration of illness and the specific or common antibody level.

It would appear that soluble, heated rickettsial or specific rickettsial antigens would serve to indicate the diagnosis of typhus fever. For differentiation of type the latter antigens are essential. Since low specific antibody titres may apparently be encountered, it would be preferable to use soluble or heated rickettsial antigen as well as specific in any diagnostic set-up. The soluble antigen has the advantage that it is available in large amounts, is a clear fluid and is stable, retaining its antigenicity for at least two and one-half years.

(b) *In Vaccinated Persons*

All personnel exposed to the possible hazard of infection at the Dufferin Section of the Connaught Medical Research Laboratories, either in mass produc-

tion of typhus vaccine or in typhus research, were given three weekly doses of bivalent vaccine before being employed in the typhus unit. Recall doses were administered at intervals thereafter. When circumstances permitted, blood

TABLE III

COMPLEMENT-FIXATION TITRES OF HUMANS INFECTED WITH TYPHUS FEVER

| Case | Day of Illness | Titre | | | | | |
|---|---|---|---|---|---|---|---|
| | | Soluble Antigen | | Specific Antigen | | Common (65°C.) Antigen | Differentiation |
| | | Epidemic | Murine | Epidemic | Murine | | |
| 2124 | 1 | 1600 | 800 | 800 | 100 | 1600 | E |
| 2422 | 2 | 1600* | 1600* | 200* | 200* | 200* | U |
| 2153 | 3 | 800 | 800 | 100* | 100* | 800 | U |
| 2504 | 4 | 12800 | 12800 | 200 | <100 | >3200 | E |
| 2581 | 5 | 12800 | 6400 | 800 | 200 | >3200 | E |
| 6 | 6 | 1600 | 800 | 800 | 100 | 800 | E |
| 512 | 7 | 3200 | 1600 | 800 | 400* | 3200 | E-P |
| Awald I | 7 | 1600 | 1600 | 400 | <100 | 800 | E |
| Awald II | 8 | >6400 | 6400 | 400 | <100 | >3200 | E |
| Awald III | 9 | >6400 | 6400 | 100 | <100 | >3200 | E-P |
| Awald IV | 10 | >6400 | 6400 | 200 | <100 | >3200 | E |
| 562 | 11 | 1600 | 800 | 400 | <100 | 800 | E |
| Amin. Moh. Said | 13 | 3200 | 1600 | 400 | <100 | 3200 | E |
| Mustapha Hassim | 14 | 6400 | 3200 | 400 | <100 | 3200 | E |
| Jones | 15 | 800 | 400 | 800 | 100 | 800 | E |
| Montgomery | 16 | 800 | 800 | 200 | <100 | 800 | E |
| Farr | 17 | 1600 | 800 | 200 | <100 | 3200 | E |
| Munrock | 18 | 3200 | 1600 | 400 | <100 | 3200 | E |
| Kasim Ali | 24 | 800 | 800 | <25 | <25 | 800 | U |
| Waddington | 28 | 400 | 400 | 400 | 100 | 400 | E |
| Morris | 29 | 200 | 400 | <100 | <100 | 400 | U |
| 2127 | 30 | 3200 | 1600 | 400 | 100 | 3200 | E |
| Tanta 13 | 31 | 3200 | 1600 | 200* | 200* | 800 | U |
| 2159 | 33 | 1600 | 800 | 400 | 100 | 1600 | E |
| 5188 | 35 | 6400 | 3200 | 200 | <100 | 1600 | E |
| Addendorf | Not stated | 3200 | 1600 | 800 | <100 | 1600 | E |
| Boswell | " " | 1600 | 400 | 1600 | 100 | 1600 | E |
| Kirkham | " " | 800 | 800 | 200* | 200* | 3200 | U |
| Mera | " " | 6400 | 3200 | 800 | <100 | 3200 | E |
| Mary Moon | " " | 800 | 400 | <25* | <25* | 800 | U |
| 2499 | " " | 3200 | 1600 | 800 | 200 | 1600 | E |
| Lester | " " | 3200 | 1600 | 400 | 100 | 3200 | E |
| O'Brien | " " | 1600 | 800 | <25 | <25 | 1600 | U |
| Abdu Mahadin | " " | >3200 | >3200 | 200 | <100 | 12800 | E |
| 2846 | " " | 3200 | 3200 | 400 | 200* | 3200 | E-P |
| Johnson | " " | 800 | 400 | 400 | <100 | 400 | E |
| Kowaleski | " " | 1600 | 800 | <100 | <100 | 800 | U |
| Holt | " " | 1600 | 400 | 800 | <100 | 400 | E |
| Stannion | " " | 200* | 200* | <25* | <25* | <100 | U |
| Graham | " " | 1600 | 400 | 100* | 100* | 1600 | U |
| Ibrilim Osm | " " | 800 | 200 | 100 | <100 | 200 | U |
| Gower | " " | 800 | 1600 | 800 | <100 | 1600 | E-P |
| Barnes | " " | 1600 | 1600 | 800 | <100 | 1600 | E |
| Amnet Assium | " " | 1600 | 1600 | 3200 | <100 | 3200 | E |
| Cauldwell | " " | 1600 | 1600 | 400 | <100 | 1600 | E |
| 56 | " " | 1600 | 1600 | 100* | 100* | 1600 | U |
| 57 | " " | 1600 | 1600 | 100* | 100* | 1600 | U |
| 58 | " " | 1600 | 1600 | 100* | 100* | 800 | U |
| 59 | " " | 1600 | 1600 | 100* | 100* | 1600 | U |
| 60 | " " | 1600 | 1600 | 100* | 100* | 1600 | U |

E—Epidemic. E-P—Probably Epidemic. U—Undetermined. *Serum anticomplementary.

samples were taken during the vaccination program. Over a period of three years we received further samples taken because of the occurrence of suspicious illness in persons handling infective preparations of rickettsiae or otherwise employed in the typhus unit at the Dufferin Section. The results of complement-fixation tests carried out with such samples of serum are shown in Table IV. Other tests were carried out on many of the serum samples and will be reported independently at a later date. As will be seen from Table IV, the majority of individuals from whom the serial samples were obtained showed marked rises in complement-fixing titre. In the majority of these twenty-two cases the illness was mild and diagnosis could not have been made on clinical grounds alone. However, the rises in complement-fixing titre are such as to leave little or no doubt that rickettsial infection had occurred.

It is notable in these results that vaccinated persons undergoing a typhus infection develop usually a high titre of specific antibody and a relatively low titre of common antibody. In all cases there was an increase in complement-fixing antibodies for both epidemic and murine type-specific antigens. In most cases the degree of response of these specific antibodies was sufficiently different that the type of infecting organism was indicated. Thus, 14 of the infections would be classed as epidemic, 3 as murine, 4 as probably murine and 1 as probably epidemic. It is possible, however, particularly in those cases where the titres of both specific antibodies were not greatly different, that we were dealing with mixed infections. This remains undetermined for we are informed that no attempts to recover virus from suspicious cases were successful. An alternative explanation for this dual response of specific antibodies could be that there is present a small amount of the so-called specific antigen of the heterologous type in the infecting rickettsiae and that this serves as a secondary stimulus in vaccinated persons. No evidence of this has been found (11) and the antibody in these sera for the presumably heterologous antigen could be removed only by absorption with rickettsiae of the same type. Finally, it might be suggested that the specific antigens of murine and epidemic rickettsiae are so closely related immunochemically that "non-specific" responses are evoked. The true explanation of this increase of both specific antibodies cannot be decided. That it was not due to lack of specificity in the test antigens was indicated by satisfactory daily controls and by the low titres of common antibody.

The specific antibody titres in these cases was higher, in general, than those found in the unvaccinated cases reported in the previous section. In regard to the latter, however, the lower titres may have been due to long standing, as mentioned above. Infection in the vaccinated might act as a secondary stimulus and account for the higher titres encountered.

The generally low level of common antibody is in sharp contrast to that found in field infections and no satisfactory explanation can be made. It is, however, in accord with the negligible production of Proteus OX19 agglutinins in these sera (6).

## Discussion

It is evident that both guinea pigs and humans develop complement-fixing antibodies following the administration of typhus vaccine. These antibodies may be of two kinds, common and specific. In both cases, however, it is the specific antibody which predominates. Hence, it is desirable in examining such sera to

TABLE IV

Complement-Fixation Titres of Vaccinated Humans Infected with Typhus Fever

| Case | Date of Onset | Date of Bleeding | Titre | | | Differentiation |
|---|---|---|---|---|---|---|
| | | | Specific Antigen | | Common (65°C.) Antigen | |
| | | | Epidemic | Murine | | |
| 1 | Mar. 29 1942 | 1/4/42<br>8/4/42 | 12.5<br>400 | 12.5<br>100 | .....<br>..... | E |
| 2 | May 20 1942 | 13/12/41<br>5/6/42<br>3/10/42<br>6/4/43 | 25<br>1600<br>800<br>800 | <25<br>3200<br>1600<br>1600 | .....<br>.....<br>.....<br><50 | M-P |
| 3 | June 6 1942 | 1/4/42<br>5/6/42<br>26/8/42<br>27/10/42<br>18/3/43<br>6 4/43 | 25<br>25<br>1600<br>1600<br>400<br>400 | 25<br>25<br>400<br>200<br>100<br>100 | .....<br>.....<br><100<br>.....<br>.....<br>..... | E |
| 4 | June 4 1942 | 12/2/42<br>5/6/42<br>3/10/42<br>21/4/43<br>9/6/43 | 12.5<br><50<br>1600<br>800<br>800 | 12.5<br><50<br>800<br>200<br>200 | 12.5<br><50<br>800<br><50<br><50 | E |
| 5 | July 1942 | 12/2/42<br>26/8/42 | <50<br>400 | <50<br>1600 | <50<br>50 | M |
| 6 | Nov. 13 1942 | 3/6/42<br>28/11/42<br>5/12/42<br>12/12/42<br>18/3/43 | <25<br>400<br>400<br>400<br>50 | <25<br>100<br>100<br>100<br>12.5 | .....<br><50<br><50<br><50<br>..... | E |
| 7 | Nov. 1942 | 16/9/42<br>6/10/42<br>27/11/42<br>18/3/43<br>6/4/43 | <25<br>100<br>800<br>400<br>200 | <25<br>50<br>>1600<br>800<br>800 | .....<br>.....<br>.....<br>.....<br>..... | M |
| 8 | Dec. 1 1942 | 1/12/42<br>30/4/43 | 25<br>800 | 25<br>1600 | .....<br>..... | M-P |
| 9 | Dec. 8 1942 | 27/11/42<br>14/12/42<br>21/4/43<br>9/6/43 | 25<br>400<br>400<br>400 | 25<br>400<br>800<br>800 | .....<br>.....<br><50<br><50 | M-P |
| 10 | Mar. 27 1943 | 2/3/43<br>29/3/43<br>2/4/43<br>9/4/43<br>9/6/43 | <12.5<br><12.5<br>1600<br>3200<br>800 | <12.5<br><12.5<br>400<br>400<br>100 | .....<br>.....<br>200<br>800<br>100 | E |

employ type-specific antigens standardized against this antibody. Due apparently to individual variation, some guinea pigs failed to produce measurable antibodies within a two-week period. This finding militates against the use of complement fixation as an antigenicity test for vaccine, though Donovick and Wychoff (2) have reported favourably on its use for this purpose. However, in view of other more direct tests for evaluating typhus vaccines, complement fixation is unlikely to be employed extensively in this way (1).

Complement-fixing antibody response to vaccine in humans indicated the importance of amount and spacing of doses for a primary course of immunization. In our hands, 3 doses of 1.0 cc. each were superior to a series of 0.25, 0.5 and

TABLE IV—*Continued*

| Case | Date of Onset | Date of Bleeding | Titre | | | Differentiation |
|---|---|---|---|---|---|---|
| | | | Specific Antigen | | Common (65°C.) Antigen | |
| | | | Epidemic | Murine | | |
| 11 | April 22 1943 | 22/4/43 | 100 | 50 | ..... | E |
| | | 7/5/43 | 1600 | 400 | <100 | |
| | | 9/6/43 | 1600 | 400 | <100 | |
| 12 | Sept. 27 1943 | 27/9/43 | 100 | <100 | <100 | E |
| | | 7/10/43 | 3200 | 200 | 200 | |
| 13 | Oct. 30 1943 | 22/4/43 | <25 | <25 | <25 | E |
| | | 22/11/43 | 6400 | 800 | <100 | |
| 14 | Nov. 13 1943 | 15/11/43 | 800 | 200 | 50 | E |
| | | 22/11/43 | 3200 | 400 | 400 | |
| 15 | Feb. 3 1944 | 21/4/43 | <25 | <25 | <25 | M |
| | | 9/6/43 | <25 | <25 | <25 | |
| | | 21/2/44 | 400 | >3200 | 400 | |
| 16 | April 21 1944 | 22/4/44 | <25 | <25 | <25 | E |
| | | 28/4/44 | 25 | <25 | <25 | |
| | | 3/5/44 | 800 | <25 | <25 | |
| | | 8/5/44 | 1600 | 100 | <100 | |
| | | 5/6/44 | 800 | 400 | <100 | |
| 17 | Jan. 10 1945 | 10/10/44 | 50 | 25 | 25 | E |
| | | 30/10/44 | 100 | 100 | 100 | |
| | | 13/1/45 | 100 | 25 | <25 | |
| | | 27/1/45 | 1600 | 200 | <25 | |
| 18 | Jan. 13 1945 | 13/1/45 | 25 | <25 | <25 | E-P |
| | | 28/2/45 | 800 | 400 | <25 | |
| | | 13/3/45 | 400 | 200 | <100 | |
| 19 | April 8 1945 | 8/4/45 | <25 | 25 | 25 | E |
| | | 19/4/45 | 3200 | 400 | 200 | |
| 20 | April 8 1945 | 11/4/45 | <25 | 400 | 200 | E |
| | | 19/4/45 | 3200 | 400 | 100 | |
| 21 | April 11 1945 | 11/4/45 | <25 | <25 | <25 | E |
| | | 28/4/45 | 800 | 100 | 200 | |
| 22 | April 9 1945 | 9/4/45 | <25 | <25 | <25 | M-P |
| | | 30/4/45 | 1600 | 3200 | 400 | |

E—Epidemic. M—Murine. M-P—Probably Murine. E-P—Probably Epidemic.

1.0 cc. amounts. Also, no matter which amounts were used, the response was better with an interval of one week between doses than with an interval of three weeks. The pronounced decrease in antibody levels five months after the primary course emphasized the wisdom of an early recall dose. A secondary stimulus evoked a sharp increase in antibody titre. The antibody produced was predominantly of the specific variety and accordingly complement fixation is superior to other tests for measuring the response to vaccine in that type-specific antigens may be employed. In this regard it may be noted that antibody response to vaccine as measured by the Weil-Felix test is poor (5), (3), (4), (7), (6), (10). Such results would be anticipated in view of the low common antibody levels found by complement fixation.

The antibody pattern in human typhus sera from unvaccinated persons was in sharp contrast to that of sera from vaccinated humans or animals in that the common antibody titre was high and, in general, exceeded the specific. The stated day of disease on which serum was obtained may not be accurate, and in any case no correlation with the titre developed could be ascertained. These sera were not examined under ideal conditions, as pointed out, due to long storage and glycerine preservative. Many of the sera were anticomplementary and it is not known whether the disproportion between common and specific antibody titres is a result of differential loss of antibody. The specific titres obtained were, on the whole, considerably lower than those reported by Plotz, Wertman and Bennett (9). They did not, however, measure the common antibody levels and strict comparisons cannot be made. It is possible that quantitative differences in the antigenic make-up of rickettsial strains might account for differences in the relative production of specific and common antibodies.

The complement-fixation test demonstrated an antibody picture in typhus fever in vaccinated persons which differed from that which followed the disease in uninoculated individuals. A high level of specific antibody was found with a lower common antibody titre. This is similar, though different in degree, to the antibody pattern observed following vaccination. This observation, in so far as complement fixation is concerned, is of importance in determining the laboratory diagnosis in cases of suspected typhus fever in previously vaccinated persons, and demonstrates the necessity of measuring specific as well as common antibodies before drawing conclusions as to the diagnosis.

## Summary and Conclusions

Typhus vaccine elicits the production of complement-fixing antibodies in a high proportion of inoculated humans and animals. The specific antibody production greatly exceeds the common, both in the number responding and the degree of response.

In humans the best antibody response was obtained by giving three doses of vaccine of 1 cc. each with one week between doses. Antibody levels fell off comparatively rapidly and the desirability of an early recall dose was indicated. The administration of a recall dose of 0.5 cc. gave very satisfactory results.

Both common and type-specific antibodies are produced in humans with typhus fever, with the predominant antibody being common antibody in uninoculated persons, and type-specific antibody in individuals who have received typhus vaccine.

The complement-fixation test, employing type-specific and common antigens, provided a ready means of estimating these antibodies. It would, therefore, appear to be the test of choice for the laboratory diagnosis and differentiation of epidemic and murine typhus fever when tests requiring the use of infective preparations of rickettsiae cannot be carried out.

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## THE WORLD HEALTH ORGANIZATION

OUT of World War I came the Health Organization of the League of Nations, and now, following World War II, a new and greater world health organization is being established. On July 22nd, in New York, representatives of sixty-one nations signed the Constitution of the new organization. It is the first specialized agency to which every member of the United Nations has subscribed, and in addition ten other nations have become signatories, indicating that the advancement of health is one field in which there is unanimity of opinion. In his address on the occasion of the signing of the Charter, Thomas Parran, Surgeon General of the United States Public Health Service and chairman of the New York conference, said: "The Organization is a collective instrument which will promote physical and mental vigor, prevent and control disease, expand scientific health knowledge, and contribute to the harmony of human relations. In short, it is a powerful instrument forged for peace."

The opening paragraph of the Constitution defines health as a "state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity", and claims that "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition." It asserts that "the health of all peoples is fundamental to the attainment of peace and security and is dependent upon the fullest co-operation of individuals and States." These and other basic principles constitute the declaration of the Organization's fundamental purpose.

It will be recalled that the formation of a world health organization was first suggested at the San Francisco Conference of the United Nations, in April, 1945. Last winter, the Economic and Social Council called a meeting of the technical preparatory committee on health, in Paris, to be followed by an international health conference in New York in June. The technical preparatory committee, consisting of sixteen experts, prepared the agenda and proposals for the inter-

national health conference, which opened on June 19th. Four weeks later the conference concluded its sessions with the establishing of an interim commission to function until the World Health Assembly is convened.

Canada has had a large part in these conferences. Dr. G. B. Chisholm, then Deputy Minister of Health, served as a member of the technical preparatory committee, and the important contributions which he made were at once recognized by his appointment as secretary of the New York conference. Subsequently he was named executive secretary of the Interim Commission. Canada's other delegate to the conference was the Hon. Brooke Claxton, Minister of National Health and Welfare. Advisers to the delegates were: Dr. C. W. MacMillan, of the Department of Health and Social Medicine, McGill University, and Past President of the Canadian Public Health Association; Dr. T. C. Routley, General Secretary of the Canadian Medical Association; Dr. Ad. Groulx, Director of the Department of Health of Montreal; and Mr. Ernest Coté of the Department of External Affairs, Ottawa.

The Constitution of the World Health Organization is presented in full elsewhere in this issue.

## THE APPOINTMENT OF DR. G. D. W. CAMERON AS DEPUTY MINISTER OF HEALTH

THE establishing of a Department of National Health for Canada in 1919 was the culmination of efforts, extending over many years, by those who appreciated the importance to the Dominion of a Federal Department of Health. The subsequent addition to the Department of heavy responsibilities in the administration of medical care and pensions for returned soldiers of the first World War, and the drastic reduction in its budgets during the depression years, prevented any extensive development of the original plans and permitted only the fulfilling of statutory obligations. A new chapter commenced with the establishment of the Department of National Health and Welfare in 1944 and the transferring of the responsibility for veterans to a new Department of Veterans Affairs. At that time, the Honourable Brooke Claxton was appointed Minister of National Health and Welfare, with Dr. G. B. Chisholm as Deputy Minister of Health and Dr. G. F. Davidson as Deputy Minister of Welfare. Very substantial progress has been made in the enlargement of the organization of the department. Provision has been made for the appointment of directors of health services, health insurance studies, and the Indian and Eskimo health services. New divisions include those relating to the health of Civil servants, mental health, dental health, tuberculosis control, and blindness control. A new laboratory, estimated to cost $1,000,000, has been planned to house the Laboratory of Hygiene and to provide accommodation also for the Food and Drugs Laboratory and the Industrial Health Laboratory. In the welfare field, the provision of family allowances has placed heavy responsibilities with the department, and an effective organization has been established.

Hardly had these commitments been undertaken than Canada was called upon to participate in the planning for the World Health Organization. The Hon. Mr. Claxton and Dr. Chisholm have given much time to the deliberations, representing the Dominion at the several international health conferences; and Dr. Chisholm has recently resigned from the Department to become executive secretary of the Interim Commission. The Hon. Mr. Claxton not only gave able leadership at the New York conference, but has been representing Canada at the Peace Conference in Paris.

Succeeding Dr. Chisholm as Deputy Minister is Dr. G. D. W. Cameron. Dr. Cameron possesses an intimate knowledge of the Health Department, having served for some years as Director of the Laboratory of Hygiene and, more recently, as Director of Health Services. He graduated in medicine from Queen's University in 1927 and, following a post-graduate course in public health at the School of Hygiene, University of Toronto, engaged in research in the Connaught Medical Research Laboratories for a number of years, conducting studies in diphtheria immunization and related fields. As director of the Laboratory of Hygiene he extended its work, providing field services and relating the laboratory to epidemiological problems. Studies were undertaken in virus infections and, with the co-operation of the Provinces of British Columbia, Alberta and Saskatchewan and of the Rockefeller Foundation, the problems presented by the occurrence of Rocky Mountain spotted fever and sylvatic plague in certain western States were carefully investigated in their relation to Canada. A special laboratory for the study of virus infections was established at Kamloops, B.C. Subsequently, as Director of Health Services, Dr. Cameron had an active part in the enlarged program, and under his able leadership the substantial progress that has been made in the development of Canada's Department of Health during the past two years will be continued.

# CONSTITUTION OF THE WORLD HEALTH ORGANIZATION

ADOPTED JULY 22, 1946, BY THE INTERNATIONAL HEALTH CONFERENCE CONVENED BY THE ECONOMIC AND SOCIAL COUNCIL OF THE UNITED NATIONS IN NEW YORK CITY

THE STATES parties to this Constitution declare, in conformity with the Charter of the United Nations, that the following principles are basic to the happiness, harmonious relations and security of all peoples:

Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.

The health of all peoples is fundamental to the attainment of peace and security and is dependent upon the fullest cooperation of individuals and States.

The achievement of any State in the promotion and protection of health is of value to all.

Unequal development in different countries in the promotion of health and control of disease, especially communicable disease, is a common danger.

Healthy development of the child is of basic importance; the ability to live harmoniously in a changing total environment is essential to such development.

The extension to all peoples of the benefits of medical, psychological, and related knowledge is essential to the fullest attainment of health.

Informed opinion and active cooperation on the part of the public are of the utmost importance in the improvement of the health of the people.

Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures.

ACCEPTING THESE PRINCIPLES, and for the purpose of cooperation among themselves and with others to promote and protect the health of all peoples, the contracting parties agree to the present Constitution and hereby establish the World Health Organization as a specialized agency within the terms of Article 57 of the Charter of the United Nations.

## CHAPTER I—OBJECTIVE

**Article 1.**—The objective of the World Health Organization (hereinafter called the Organization) shall be the attainment by all peoples of the highest possible level of health.

## CHAPTER II—FUNCTIONS

**Article 2.**—In order to achieve its objective, the functions of the Organization shall be:

(*a*) to act as the directing and coordinating authority on international health work;

(*b*) to establish and maintain effective collaboration with the United Nations, specialized agencies, governmental health administrations, professional groups, and such other organizations as may be deemed appropriate;

(*c*) to assist governments, upon request, in strengthening health services;

(*d*) to furnish appropriate technical assistance and, in emergencies, necessary aid upon the request or acceptance of governments;

(*e*) to provide or assist in providing, upon the request of the United Nations, health services and facilities to special groups, such as the peoples of trust territories;

(*f*) to establish and maintain such administrative and technical services as may be required, including epidemiological and statistical services;

(*g*) to stimulate and advance work to eradicate epidemic, endemic, and other diseases;

(*h*) to promote, in cooperation with other specialized agencies where necessary, the prevention of accidental injuries;

(*i*) to promote, in cooperation with other specialized agencies where necessary, the improvement of nutrition, housing, sanitation, recreation, economic or working conditions, and other aspects of environmental hygiene;

(*j*) to promote cooperation among scientific and professional groups which contribute to the advancement of health;

(*k*) to propose conventions, agreements, and regulations, and make recommendations with respect to international health matters and to perform such duties as may be assigned thereby to the Organization and are consistent with its objective;

(*l*) to promote maternal and child health and welfare and to foster the ability to live harmoniously in a changing total environment;

(*m*) to foster activities in the field of mental health, especially those affecting the harmony of human relations;

(*n*) to promote and conduct research in the field of health;

(*o*) to promote improved standards of teaching and training in the health, medical and related professions;

(*p*) to study and report on, in cooperation with other specialized agencies where necessary, administrative and social techniques affecting public health and medical care from preventive and curative points of view, including hospital services and social security;

(*q*) to provide information, counsel and assistance in the field of health;

(*r*) to assist in developing an informed public opinion among all peoples on matters of health;

(*s*) to establish and revise as necessary international nomenclatures of diseases, of causes of death and of public health practices;

(*t*) to standardize diagnostic procedures as necessary;

(*u*) to develop, establish and promote international standards with respect to food, biological, pharmaceutical and similar products;

(*v*) generally to take all necessary action to attain the objective of the Organization.

## CHAPTER III—MEMBERSHIP AND ASSOCIATE MEMBERSHIP

**Article 3.**—Membership in the Organization shall be open to all States.

**Article 4.**—Members of the United Nations may become Members of the Organization by signing or otherwise accepting this Constitution in accordance with the provisions of Chapter XIX and in accordance with their constitutional processes.

**Article 5.**—The States whose governments have been invited to send observers to the International Health Conference held in New York, 1946, may become Members by signing or otherwise accepting this Constitution in accordance with the provisions of Chapter XIX and in accordance with their constitutional processes provided that such signature or acceptance shall be completed before the first session of the Health Assembly.

**Article 6.**—Subject to the conditions of any agreement between the United Nations and the Organization, approved pursuant to Chapter XVI, States which do not become Members in accordance with Articles 4 and 5 may apply to become Members and shall be admitted as Members when their application has been approved by a simple majority vote of the Health Assembly.

**Article 7.**—If a Member fails to meet its financial obligations to the Organization or in other exceptional circumstances, the Health Assembly may, on such conditions as it thinks proper, suspend the voting privileges and services to which a Member is entitled. The Health Assembly shall have the authority to restore such voting privileges and services.

**Article 8.**—Territories or groups of territories which are not responsible for the conduct of their international relations may be admitted as Associate Members by the Health Assembly upon application made on behalf of such territory or group of territories by the Member or other authority having responsibility for their international relations. Representatives of Associate Members to the Health Assembly should be qualified by their technical competence in the field of health and should be chosen from the native population. The nature and extent of the rights and obligations of Associate Members shall be determined by the Health Assembly.

## CHAPTER IV—ORGANS

**Article 9.**—The work of the Organization shall be carried out by:

(*a*) The World Health Assembly (hereinafter called the Health Assembly);
(*b*) The Executive Board (hereinafter called the Board);
(*c*) The Secretariat.

## CHAPTER V—THE WORLD HEALTH ASSEMBLY

**Article 10.**—The Health Assembly shall be composed of delegates representing Members.

**Article 11.**—Each Member shall be represented by not more than three delegates, one of whom shall be designated by the Member as chief delegate. These delegates should be chosen from among persons most qualified by their technical competence in the field of health, preferably representing the national health administration of the Member.

**Article 12.**—Alternates and advisers may accompany delegates.

**Article 13.**—The Health Assembly shall meet in regular annual session and in such special sessions as may be necessary. Special sessions shall be convened at the request of the Board or of a majority of the Members.

**Article 14.**—The Health Assembly, at each annual session, shall select the country or region in which the next annual session shall be held, the Board subsequently fixing the place. The Board shall determine the place where a special session shall be held.

**Article 15.**—The Board, after consultation with the Secretary-General of the United Nations, shall determine the date of each annual and special session.

**Article 16.**—The Health Assembly shall elect its President and other officers at the beginning of each annual session. They shall hold office until their successors are elected.

**Article 17.**—The Health Assembly shall adopt its own rules of procedure.

**Article 18.**—The functions of the Health Assembly shall be:

(*a*) to determine the policies of the Organization;
(*b*) to name the Members entitled to designate a person to serve on the Board;
(*c*) to appoint the Director-General;
(*d*) to review and approve reports and activities of the Board and of the Director-General and to instruct the Board in regard to matters upon which action, study, investigation or report may be considered desirable;
(*e*) to establish such committees as may be considered necessary for the work of the Organization;
(*f*) to supervise the financial policies of the Organization and to review and approve the budget;
(*g*) to instruct the Board and the Director-General to bring to the attention of Members and of international organizations, governmental or nongovernmental, any matter with regard to health which the Health Assembly may consider appropriate;
(*h*) to invite any organization, international or national, governmental or nongovernmental, which has responsibilities related to those of the Organization, to appoint representatives to participate, without right of vote, in its meetings or in those of the committees and conferences convened under its authority, on conditions prescribed by the Health Assembly; but in the case of national organizations, invitations shall be issued only with the consent of the government concerned;
(*i*) to consider recommendations bearing on health made by the General Assembly, the Economic and Social Council, the Security Council or Trusteeship Council of the United Nations, and to report to them on the steps taken by the Organization to give effect to such recommendations;
(*j*) to report to the Economic and Social Council in accordance with any agreement between the Organization and the United Nations;

(*k*) to promote and conduct research in the field of health by the personnel of the Organization, by the establishment of its own institutions or by cooperation with official or non-official institutions of any Member with the consent of its government;

(*l*) to establish such other institutions as it may consider desirable;

(*m*) to take any other appropriate action to further the objective of the Organization.

**Article 19.**—The Health Assembly shall have authority to adopt conventions or agreements with respect to any matter within the competence of the Organization. A two-thirds vote of the Health Assembly shall be required for the adoption of such conventions or agreements which shall come into force for each Member when accepted by it in accordance with its constitutional processes.

**Article 20.**—Each Member undertakes that it will, within 18 months after adoption by the Health Assembly of a convention or agreement, take action relative to the acceptance of such convention or agreement. Each Member shall notify the Director-General of the action taken and if it does not accept such convention or agreement within the time limit, it will furnish a statement of the reasons for nonacceptance. In case of acceptance, each Member agrees to make an annual report to the Director-General in accordance with Chapter XIV.

**Article 21.**—The Health Assembly shall have authority to adopt regulations concerning:

(*a*) sanitary and quarantine requirements and other procedures designed to prevent the international spread of disease;

(*b*) nomenclatures with respect to diseases, causes of death and public health practices;

(*c*) standards with respect to diagnostic procedures for international use;

(*d*) standards with respect to the safety, purity and potency of biological, pharmaceutical, and similar products moving in international commerce;

(*e*) advertising and labeling of biological, pharmaceutical and similar products moving in international commerce.

**Article 22.**—Such Regulations adopted pursuant to Article 21 shall come into force for all Members after due notice has been given of their adoption by the Health Assembly except for such Members as may notify the Director-General of rejection or reservations within the period stated in the notice.

**Article 23.**—The Health Assembly shall have authority to make recommendations to Members with respect to any matter within the competence of the Organization.

## CHAPTER VI—THE EXECUTIVE BOARD

**Article 24.**—The Board shall consist of 18 persons designated by as many Members. The Health Assembly, taking into account an equitable geographical distribution, shall elect the Members entitled to designate a person to serve on the Board. Each of these Members should appoint to the Board a person technically qualified in the field of health, who may be accompanied by alternates and advisers.

**Article 25.**—These Members shall be elected for 3 years and may be re-elected; provided that of the Members elected at the first session of the Health Assembly, the terms of six Members shall be for 1 year and the terms of six Members shall be for 2 years, as determined by lot.

**Article 26.**—The Board shall meet at least twice a year and shall determine the place of each meeting.

**Article 27.**—The Board shall elect its Chairman from among its Members and shall adopt its own rules of procedure.

**Article 28.**—The functions of the Board shall be:

(*a*) to give effect to the decisions and policies of the Health Assembly;

(*b*) to act as the executive organ of the Health Assembly;

(*c*) to perform any other functions entrusted to it by the Health Assembly;

(*d*) to advise the Health Assembly on questions referred to it by that body and on matters assigned to the Organization by conventions, agreements, and regulations;

(*e*) to submit advice or proposals to the Health Assembly on its own initiative;

(*f*) to prepare the agenda of meetings of the Health Assembly;

(*g*) to submit to the Health Assembly for consideration and approval a general program of work covering a specific period;

(*h*) to study all questions within its competence;

(*i*) to take emergency measures within the functions and financial resources of the Organization to deal with events requiring immediate action. In particular it may authorize the Director-General to take the necessary steps to combat epidemics, to participate in the organization of health relief to victims of a calamity and to undertake studies and research the urgency of which has been drawn to the attention of the Board by any Member or by the Director-General.

**Article 29.**—The Board shall exercise on behalf of the whole Health Assembly the powers delegated to it by that body.

## CHAPTER VII—THE SECRETARIAT

**Article 30.**—The Secretariat shall comprise the Director-General and such technical and administrative staff as the Organization may require.

**Article 31.**—The Director-General shall be appointed by the Health Assembly on the nomination of the Board on such terms as the Health Assembly may determine. The Director-General, subject to the authority of the Board, shall be the chief technical and administrative officer of the Organization.

**Article 32.**—The Director-General shall be ex-officio Secretary of the Health Assembly of the Board, of all commissions and committees of the Organization and of conferences convened by it. He may delegate these functions.

**Article 33.**—The Director-General or his representative may establish a procedure by agreement with Members, permitting him, for the purpose of discharging his duties, to have direct access to their various departments, especially to their health administrations and to national health organizations, governmental or nongovernmental. He may also establish direct relations with international organizations whose activities come within the competence of the Organization. He shall keep Regional Offices informed on all matters involving their respective areas.

**Article 34.**—The Director-General shall prepare and submit annually to the Board the financial statements and budget estimates of the Organization.

**Article 35.**—The Director-General shall appoint the staff of the Secretariat in accordance with staff regulations established by the Health Assembly. The paramount consideration in the employment of the staff shall be to assure that the efficiency, integrity, and internationally representative character of the Secretariat shall be maintained at the highest level. Due regard shall be paid also to the importance of recruiting the staff on as wide a geographical basis as possible.

**Article 36.**—The conditions of service of the staff of the Organization shall conform as far as possible with those of other United Nations organizations.

**Article 37.**—In the performance of their duties the Director-General and the staff shall not seek or receive instructions from any government or from any authority external to the Organization. They shall refrain from any action which might reflect on their position as international officers. Each Member of the Organization on its part undertakes to respect the exclusively international character of the Director-General and the staff and not to seek to influence them.

## CHAPTER VIII—COMMITTEES

**Article 38.**—The Board shall establish such committees as the Health Assembly may direct and, on its own initiative or on the proposal of the Director-General, may establish

any other committees considered desirable to serve any purpose within the competence of the Organization.

**Article 39.**—The Board, from time to time and in any event annually, shall review the necessity for continuing each committee.

**Article 40.**—The Board may provide for the creation of or the participation by the Organization in joint or mixed committees with other organizations and for the representation of the Organization in committees established by such other organizations.

## CHAPTER IX—CONFERENCES

**Article 41.**—The Health Assembly or the Board may convene local, general, technical or other special conferences to consider any matter within the competence of the Organization and may provide for the representation at such conferences of international organizations and, with the consent of the government concerned, of national organizations, governmental or nongovernmental. The manner of such representation shall be determined by the Health Assembly or the Board.

**Article 42.**—The Board may provide for representation of the Organization at conferences in which the Board considers that the Organization has an interest.

## CHAPTER X—HEADQUARTERS

**Article 43.**—The location of the headquarters of the Organization shall be determined by the Health Assembly after consultation with the United Nations.

## CHAPTER XI—REGIONAL ARRANGEMENTS

**Article 44.**—

(*a*) The Health Assembly shall from time to time define the geographical areas in which it is desirable to establish a regional organization.

(*b*) The Health Assembly may, with the consent of a majority of the Members situated within each area so defined, establish a regional organization to meet the special needs of such area. There shall not be more than one regional organization in each area.

**Article 45.**—Each regional organization shall be an integral part of the Organization in accordance with this Constitution.

**Article 46.**—Each regional organization shall consist of a Regional Committee and a Regional Office.

**Article 47.**—Regional Committees shall be composed of representatives of the Member States and Associate Members in the region concerned. Territories or groups of territories within the region, which are not responsible for the conduct of their international relations and which are not Associate Members, shall have the right to be represented and to participate in Regional Committees. The nature and extent of the rights and obligations of these territories or groups of territories in Regional Committees shall be determined by the Health Assembly in consultation with the Member or other authority having responsibility for the international relations of these territories and with the Member States in the region.

**Article 48.**—Regional Committees shall meet as often as necessary and shall determine the place of each meeting.

**Article 49.**—Regional Committees shall adopt their own rules of procedure.

**Article 50.**—The functions of the Regional Committee shall be:

(*a*) to formulate policies governing matters of an exclusively regional character;

(*b*) to supervise the activities of the Regional Office;

(*c*) to suggest to the Regional office the calling of technical conferences and such additional work or investigation in health matters as in the opinion of the Regional Committee would promote the objective of the Organization within the region;

(*d*) to co-operate with the respective regional committees of the United Nations and with those of other specialized agencies and with other regional international organizations having interests in common with the Organization;

(*e*) to tender advice, through the Director-General, to the organization on international health matters which have wider than regional significance;

(*f*) to recommend additional regional appropriations by the governments of the respective regions if the proportion of the central budget of the Organization allotted to that region is insufficient for the carrying out of the regional functions;

(*g*) such other functions as may be delegated to the Regional Committee by the Health Assembly, the Board or the Director-General.

**Article 51.**—Subject to the general authority of the Director-General of the Organization, the Regional Office shall be the administrative organ of the Regional Committee. It shall, in addition, carry out within the region the decisions of the Health Assembly and of the Board.

**Article 52.**—The head of the Regional Office shall be the Regional Director appointed by the Board in agreement with the Regional Committee.

**Article 53.**—The staff of the Regional Office shall be appointed in a manner to be determined by agreement between the Director-General and the Regional Director.

**Article 54.**—The Pan-American sanitary organization represented by the Pan-American Sanitary Bureau and the Pan-American Sanitary Conferences, and all other intergovernmental regional health organizations in existence prior to the date of signature of this Constitution, shall in due course be integrated with the Organization. This integration shall be effected as soon as practicable through common action based on mutual consent of the competent authorities expressed through the organizations concerned.

## CHAPTER XII—BUDGET AND EXPENSES

**Article 55.**—The Director-General shall prepare and submit to the Board the annual budget estimates of the Organization. The Board shall consider and submit to the Health Assembly such budget estimates, together with any recommendations the Board may deem advisable.

**Article 56.**—Subject to any agreement between the Organization and the United Nations, the Health Assembly shall review and approve the budget estimates and shall apportion the expenses among the Members in accordance with a scale to be fixed by the Health Assembly.

**Article 57.**—The Health Assembly or the Board acting on behalf of the Health Assembly may accept and administer gifts and bequests made to the Organization provided that the conditions attached to such gifts or bequests are acceptable to the Health Assembly or the Board and are consistent with the objective and policies of the Organization.

**Article 58.**—A special fund to be used at the discretion of the Board shall be established to meet emergencies and unforeseen contingencies.

## CHAPTER XIII—VOTING

**Article 59.**—Each Member shall have one vote in the Health Assembly.

**Article 60.**—(*a*) Decisions of the Health Assembly on important questions shall be made by a two-thirds majority of the Members present and voting. These questions shall include: the adoption of conventions or agreements; the approval of agreements bringing the Organization into relation with the United Nations and intergovernmental organizations and agencies in accordance with Articles 69, 70, and 72; amendments to this Constitution.

(*b*) Decisions on other questions, including the determination of additional categories of questions to be decided by a two-thirds majority, shall be made by a majority of the Members present and voting.

(*c*) Voting on analogous matters in the Board and in committees of the Organization shall be made in accordance with paragraphs (*a*) and (*b*) of this article.

## CHAPTER XIV—REPORTS SUBMITTED BY STATES

**Article 61.**—Each Member shall report annually to the Organization on the action taken and progress achieved in improving the health of its people.

**Article 62.**—Each Member shall report annually on the action taken with respect to recommendations made to it by the Organization and with respect to conventions, agreements, and regulations.

**Article 63.**—Each Member shall communicate promptly to the Organization important laws, regulations, official reports and statistics pertaining to health which have been published in the State concerned.

**Article 64.**—Each Member shall provide statistical and epidemiological reports in a manner to be determined by the Health Assembly.

**Article 65.**—Each Member shall transmit upon the request of the Board such additional information pertaining to health as may be practicable.

## CHAPTER XV—LEGAL CAPACITY, PRIVILEGES, AND IMMUNITIES

**Article 66.**—The Organization shall enjoy in the territory of each Member such legal capacity as may be necessary for the fulfilment of its objective and for the exercise of its functions.

**Article 67.**—(*a*) The Organization shall enjoy in the territory of each Member such privileges and immunities as may be necessary for the fulfilment of its objective and for the exercise of its functions.

(*b*) Representatives of Members, persons designated to serve on the Board, and technical and administrative personnel of the Organization shall similarly enjoy such privileges and immunities as are necessary for the independent exercise of their functions in connection with the Organization.

**Article 68.**—Such legal capacity, privileges, and immunities shall be defined in a separate agreement to be prepared by the Organization in consultation with the Secretary-General of the United Nations and concluded between the Members.

## CHAPTER XVI—RELATIONS WITH OTHER ORGANIZATIONS

**Article 69.**—The Organization shall be brought into relation with the United Nations as one of the specialized agencies referred to in Article 57 of the Charter of the United Nations. The agreement or agreements bringing the Organization into relation with the United Nations shall be subject to approval by a two-thirds vote of the Health Assembly.

**Article 70.**—The Organization shall establish effective relations and cooperate closely with such other intergovernmental organizations as may be desirable. Any formal agreement entered into with such organizations shall be subject to approval by a two-thirds vote of the Health Assembly.

**Article 71.**—The Organization may, on matters within its competence, make suitable arrangements for consultation and cooperation with nongovernmental international organizations and, with the consent of the government concerned, with national organizations, governmental or nongovernmental.

**Article 72.**—Subject to the approval by a two-thirds vote of the Health Assembly, the Organization may take over from any other international organization or agency whose purpose and activities lie within the field of competence of the Organization such functions, resources, and obligations as may be conferred upon the Organization by international agreement or by mutually acceptable arrangements entered into between the competent authorities of the respective organization.

## CHAPTER XVII—AMENDMENTS

**Article 73.**—Texts of proposed amendments to this Constitution shall be communicated by the Director-General to Members at least 6 months in advance of their consideration by the Health Assembly. Amendments shall come into force for all Members when adopted by a two-thirds vote of the Health Assembly and accepted by two-thirds of the Members in accordance with their respective constitutional processes.

## CHAPTER XVIII—INTERPRETATION

**Article 74.**—The Chinese, English, French, Russian, and Spanish texts of this Constitution shall be regarded as equally authentic.

**Article 75.**—Any question or dispute concerning the interpretation or application of this Constitution which is not settled by negotiation or by the Health Assembly shall be referred to the International Court of Justice in conformity with the Statute of the Court, unless the parties concerned agree on another mode of settlement.

**Article 76.**—Upon authorization by the General Assembly of the United Nations or upon authorization in accordance with any agreement between the Organization and the United Nations, the Organization may request the International Court of Justice for an advisory opinion on any legal question arising within the competence of the Organization.

**Article 77.**—The Director-General may appear before the Court on behalf of the Organization in connection with any proceedings arising out of any such request for an advisory opinion. He shall make arrangements for the presentation of the case before the Court, including arrangements for the argument of different views on the question.

## CHAPTER XIX—ENTRY INTO FORCE

**Article 78.**—Subject to the provisions of Chapter III, this Constitution shall remain open to all States for signature or acceptance.

**Article 79.**—(*a*) States may become parties to this Constitution by

(i) signature without reservation as to approval;
(ii) signature subject to approval followed by acceptance; or
(iii) acceptance.

(*b*) Acceptance shall be effected by the deposit of a formal instrument with the Secretary-General of the United Nations.

**Article 80.**—This Constitution shall come into force when 26 Members of the United Nations have become parties to it in accordance with the provisions of Article 79.

**Article 81.**—In accordance with Article 102 of the Charter of the United Nations, the Secretary-General of the United Nations will register this Constitution when it has been signed without reservation as to approval on behalf of one State or upon deposit of the first instrument of acceptance.

**Article 82.**—The Secretary-General of the United Nations will inform States parties to this Constitution of the date when it has come into force. He will also inform them of the dates when other States have become parties to this Constitution.

# INDUSTRIAL HYGIENE ABSTRACTS

## Personality Problems in Managerial Groups

In the words of Glenn Frank, the challenge to the managerial group in industry is, to be "not merchants of dead yesterdays but guides into unborn tomorrows."

Managers are human beings and have personality problems and conflicts both individually as well as in their interpersonal relations. A frequent source of frustration has been unevenness in the growth of an organization where departments have expanded without changing sufficiently the original set-up of the organization to make possible provisions for new needs. In many industries too, the word "co-operation" is not understood. It is left too much to chance. The lack of flexibility characteristic of many managerial groups, due to stereotyped ideas in the minds of the members, has contributed also to many difficulties.

The author of this article discusses the need in American industry for the application of organized knowledge of human relations. In his opinion, the techniques which have been developed for the mutual solving of human problems are not known to very many managers.

A number of actual cases are reviewed as illustrations of problems that develop in industrial situations, and the method of resolving the conflicts. The significance of emotional climate in a department or a plant as a whole, must be understood. The value of reciprocal relationship is stressed. The author maintains that integrated management is impossible without a conscious effort to eliminate jealousies, rivalries, frustrations—without an increase of naturalness and spontaneity which makes genuine co-operation possible.

*H. Meltzer, Indust. Med., 1946,* **15**: *429.*

## Food Poisoning in Industrial Plants in New York State

In this article the authors analyze briefly the factors which have been responsible for outbreaks of food poisoning in cafeterias where it has been possible to make careful studies to ascertain the cause. They maintain that control and prevention are entirely practicable, depending upon certain precautions which can be taken to prevent other similar outbreaks.

Food can be easily contaminated by persons handling it, either through direct contact with an infected wound or with pathogenic organisms from nose and throat in coughing and sneezing. Food is an excellent culture medium for bacteria; outbreaks of food poisoning in plant cafeterias or public eating places are attributable to inadequate refrigeration and improper handling of food. The principal causes of these conditions include lack of responsible personnel, trained in the sanitary and proper handling of food, the overburdening of the kitchen facilities, the unavailibility of proper equipment, and in some instances, shortcuts and improper processing of foods.

After discussing the clinical pictures shown by the two types of gastroenteritis: (1) bacterial infection, usually due to an organism of the Salmonella (paratyphoid-enteritidis) group, and (2) actual poisoning with a toxin, usually the toxin secreted by the haemolytic *Staphylococcus aureus* organism, and the foods likely to have caused each, the authors state certain precautions advised to prevent such outbreaks. They call attention also to certain sanitary codes dealing specifically with restaurant sanitation where food is sold to be consumed on the premises. Among the requirements are the proper refrigeration of all perishable foodstuffs except when actually being served and the prohibiting of people from handling food in such an establishment if suffering from a disease transmissible through food.

*James E. Perkins and May R. Mayers, Monthly Rev., Div. Ind. Hyg. and Saf. Stand., New York State Dept. of Labor, April 1, 1946.*

## Industrial Medicine

In The June issue of the Ontario Medical Association Review, the Section of Industrial Medicine of the Ontario Medical Association has published an article for the guidance of physicians who are having their first formal contact with industry in the supervision of employees' health.

The material is well prepared and introduces the reader to such topics as accommodation and staff requirements, an industrial health services program, duties of part-time medical officers, ethics, remuneration, etc.

Copies of the article may be obtained by writing to the Journal offices or directly to the Ontario Medical Association Review, 135 St. Clair Avenue West, Toronto 5.